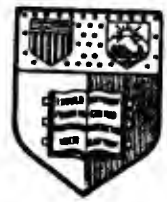

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MY GARDEN.

LONDON:
R. CLAY, SONS, AND TAYLOR, PRINTERS,
BREAD STREET HILL.

MY GARDEN

ITS PLAN AND CULTURE

TOGETHER WITH

A GENERAL DESCRIPTION OF ITS

GEOLOGY, BOTANY, AND NATURAL HISTORY

BY

ALFRED SMEE, F.R.S.

Fellow of the Royal College of Surgeons of England;
Fellow of the Chemical Society; Fellow of the Horticultural Society;
Member of the Scientific and Fruit Committees of the Horticultural Society;
Medical Officer of the Bank of England;
&c. &c.

ILLUSTRATED WITH ONE THOUSAND THREE HUNDRED ENGRAVINGS

Μεγάλα καὶ θαυμαστὰ τὰ ἔργα σου, Κύριε ὁ Θεὸς ὁ παντοκράτωρ.

REV. XV. 3.

SECOND EDITION, REVISED AND CORRECTED

LONDON

BELL AND DALDY, YORK STREET, COVENT GARDEN

1872

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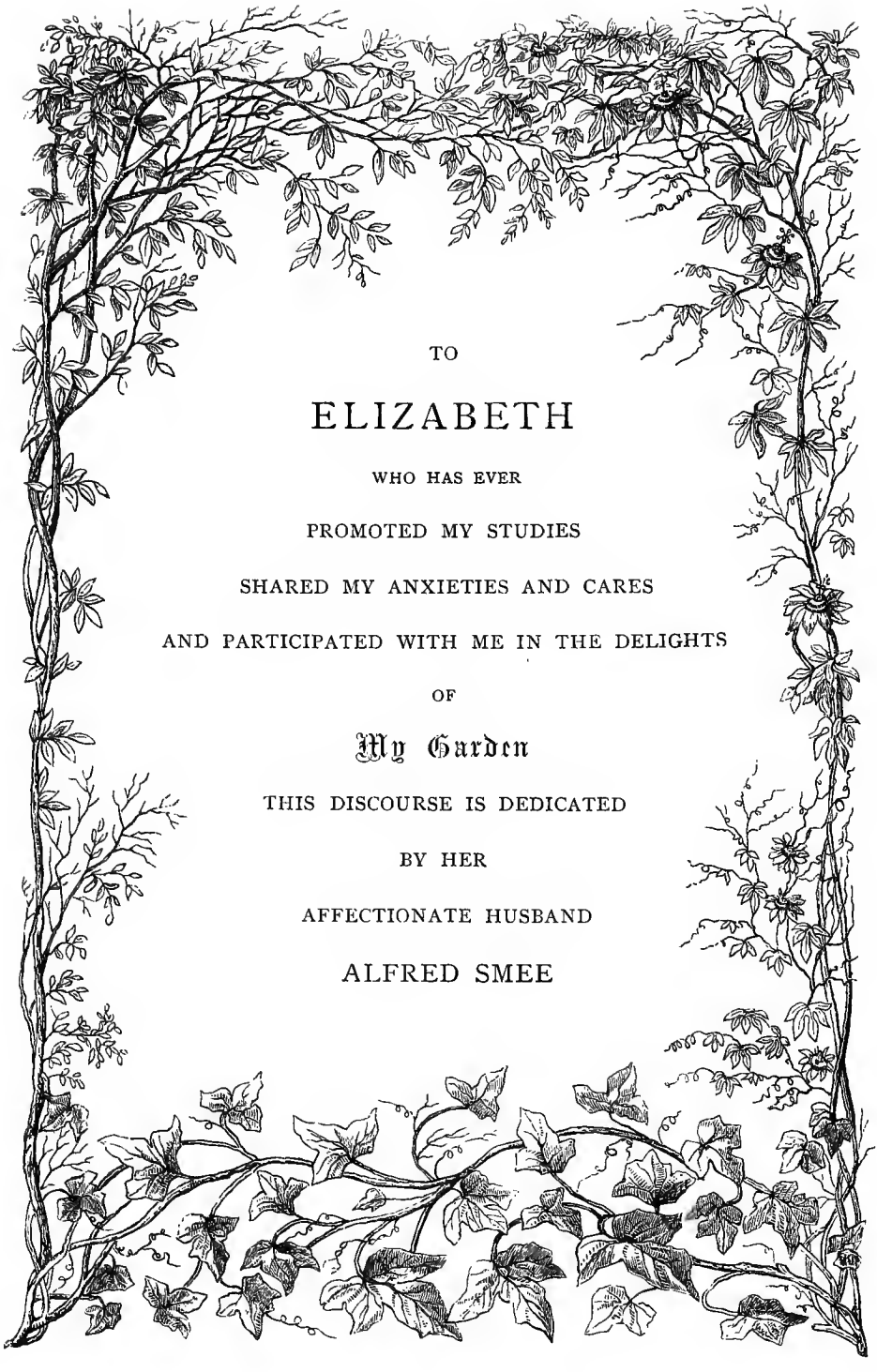

TO

ELIZABETH

WHO HAS EVER

PROMOTED MY STUDIES

SHARED MY ANXIETIES AND CARES

AND PARTICIPATED WITH ME IN THE DELIGHTS

OF

My Garden

THIS DISCOURSE IS DEDICATED

BY HER

AFFECTIONATE HUSBAND

ALFRED SMEE

Vign. I.—The Rector's Walk.

PREFACE.

"In the country 'tis true ye have woods, gardens, springs, and brooks that may entertain the eye, but these are all mute, and there's no edification without discourse."—ERASMUS.

THE purpose of this book is to discourse on "My Garden," the more important plants growing in it, and the manner in which they are cultivated. It also treats of all objects appertaining to it.

My garden has been designed both for the purpose of obtaining information and for practical uses, as my residence in London is exclusively supplied with vegetals, fruit, and flowers.

I have required, and received, assistance in all the departments of Nature which have come within the scope of my discourse. From Dr. Gray, of the British Museum, the veteran of natural history, I have ever received the kindest consideration and aid, and especially on the present occasion on matters connected with the land and fresh-water shells. Dr. Günther, also of the British Museum, has given me the fullest aid upon questions appertaining to fresh-water fish. Mr. Woodward has rendered his valuable assistance on geological questions; and the gentlemen having charge of the numismatic and

archæological departments have kindly afforded me information upon these subjects. Dr. Birch has kindly given me the result of his extensive knowledge; and Mr. Herbert Grueber has materially aided in the verification of references.

Sir Henry James, with his customary urbanity, has obliged me by supplying from the Ordnance Survey Office the geological map of the district as well as that of the section of the London Basin. The geological section of my garden was made for me by Mr. Alfred Tylor, of Shepley House, Carshalton; and the Map of the District was rectified to the present time by Mr. Addy, the former Resident Engineer to the Croydon Board of Works.

I have also to acknowledge the kindness of Dr. Hooker, the Director of the Royal Gardens at Kew, who has supplied me with plants and information on many botanical questions.

To Mr. Terry, of Peterborough House, Fulham, I have been indebted over a series of years for a variety of plants and also for illustrations for this work.

Mr. Addy has given me information upon his important Roman and Anglo-Saxon discoveries at Beddington, and I am also indebted to him for the accurate drawings with which he has supplied me. From Mr. Flower, the distinguished antiquary, I have also received important information and aid.

Mrs. Jackson, of Carshalton, supplied the drawing of the mill on the Wandle (plate 7), and Mrs. Horne, of Staines, made from photographs the beautiful drawing of the road which skirts my garden, and of the summer-house; the same lady also designed the border for the Dedication.

Several of the drawings of aphides were executed by Mr. Buckton, who is preparing a monograph on those creatures.

Although a large majority of the drawings were executed from objects procured directly from my garden, yet Dr. Boisduval, the distinguished author of the "Essai sur l'Entomologie Horticole," gave me his permission to copy such figures in his admirable work as were applicable to this volume. Messrs. Blackie were also so kind as to permit me to use several illustrations from the important treatise of Mr. Curtis on "Insects injurious to the Farmer."

My daughter Elizabeth Mary has rendered valuable assistance by tracing back the historical subjects to their origin, in Chapter I., and also by compiling and writing the Chapter on the Gardens of Various Nations. I am also indebted to her for the Analytical Index.

My son Alfred Hutchison rendered me much information in the section upon Birds; and supplied the specimens for the figures, and generally superintended their execution. Without his general aid this book could not have been produced.

The artistic drawings of the various views in "my garden" were made by Mr. H. Robertson, and the faithful manner in which Mr. Palmer has rendered them needs no commendation. The drawings for many of the smaller vignettes were executed by Mr. Holloway, and engraved by Mr. Harrison.

The general botanical drawings have been made and engraved by Mr. Worthington Smith, the fungologist, who not only drew and engraved one thousand of the woodcuts from nature, but has also rendered frequent and valuable botanical assistance.

During the preparation of this work many other distinguished friends have given me their help, which has been acknowledged in the text.

Great as has been the aid which has been afforded to me, considerable as has been the time and labour bestowed upon this work in my leisure moments, long as has been the time over a series of many years during which my observations have extended, and notwithstanding that its preparation has been a pleasure, as a labour of love, and a relaxation from more serious duties,—yet it falls far short of that ideal perfection which I may conceive in my mind, but which I have been unable to realize with my pen.

7, FINSBURY CIRCUS,
May 18, 1872.

Vign. II.—Road bordering my Garden (Winter).

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327. Rivers' Orange.
328. Rivers' Seedling, No. 23.
329. Rivers' Seedling, No. 93.
330. Fan-shaped Peach-tree.
331. The "Cordon Oblique."

CHERRIES.

332. Early Purple Gean Cherry.
333. Black Eagle.
334. Bigarreau Duke.
335. Morello.
336. October Cherry.

CURRANTS.

337. Black Currants.
338. White Currants.
339. Red Currants.

GOOSEBERRIES.

340. Early Sulphur Gooseberry.
341. Red Warrington.
342. Broon Girl.
343. Smuggler (yellow).
344. Crown Bob.
345. Banksman.

STRAWBERRIES.

346. Black Prince.
347. Keen's Seedling.
348. British Queen.
349. Amateur.
350. Dr. Hogg.
351. Eleanor.
352. Eliza.
353. Perpetual Alpine.
354. Cells of ripe Strawberry.

RASPBERRIES.

355. Falstaff Red.
356. Yellow Autumn.

GRAPES.

357. Black Hamburgh.
358. Black Prince.
359. Trentham Black.
360. Ingram's Prolific Muscat.
361 Chasselas Musqué.
362. White Frontignan.
363. Standish's Citronelle.
364. Buckland's Sweetwater.
365. Lady Downe.
366. Waltham Seedling.
367. Black Monnukka.
368. Muscat of Alexandria.

MELON.

369. Scarlet Melon.

NUTS.

370. Red Filbert.
371. Cosford Nut.
372. Cob Nut.
373. Nut, male, and female flowers.
374. Walnut.
375. Sweet Chestnut.
376. Almond.

VARIOUS FRUITS.

377. Orange blossom.
378. Fig.
379. Mulberry.
380. Prickly Pear.
381. Opuntia Rafflesquiana.
382. Loquat.
383. Banana.
384. Passion-flower Fruit.
385. Passiflora macrocarpa.
386. Pomegranate.
387. Eugenia ugni.
388. Cape Gooseberry.
389. American Cranberry.
390. Cloudberry (Rubus Chamæmorus).
390a. Dewberry.
391. Berberry.
392. Elderberry.
393. Queen Pine-apple.
394. Pine-apple in flower.

FLOWERS.

BULBOUS PLANTS.

395. Snowdrop.
396. Crocus vernus.
397. Hyacinth.
398. Corbularia conspicua.
399. Narcissus Jonquilla.
400. N. maximus.
401. N. incomparabilis.
402. N. poeticus.
403. N. Tazetta.
404. Fritillary.
405. Spring Snow-flake.
406. Summer Snow-flake.
407. Dog-tooth Violet.
408. Winter Aconite.
409. Garden Anemone.
410. Anemone vitifolia.
411. Anemone hepatica.
412. Ranunculus.
413. Parrot Tulip.
414. Common Garden Tulip.
414a. Single Van Thol Tulip.
415. Dielytra spectabilis.
416. Ixia.
417. Iris.
418. Gladiolus.
419. White Lily.
420. L. lancifolium.

FIG.
421. L. auratum.
422. L. canadense flavum.
423. Tigridia pavonia.
424. Canna indica.
424*a*. Calla Æthiopica.
425. Tuberose.
426. Tritoma Uvaria.
427. Tritonia aurea.

PERENNIALS.

428. Russian Violet.
429. Parker's Yellow Violet.
430. Heartsease.
431. Primrose.
432. Primula japonica.
432*a*. Cowslip.
433 Polyanthus.
434. Lupin.
435. Christmas Rose.
436. Wallflower.
437. Doronicum caucasicum.
437*a*. Double Daisy.
438. Variegated Lily of the Valley.
439. White Pink.
440. Variegated Pink.
441. Glass funnel.
442. Carnations.
443. Picotees.
444. Large Snapdragon.
445. Variegated Columbine.
446. Perennial Larkspur.
447. Eschscholtzia californica.
448. Pentstemon.
449. Herbaceous Phlox.
450. Hollyhock.
451. Dahlia.
452. Rudbeckia.
453. Helianthus decapetalus.
453*a*. Sea Holly.
454. Chinese Chrysanthemum.
455. Japanese Chrysanthemum.
456. Pompones.
457. Acanthus mollis.
458. Lobelia fulgens.
459. Double Pyrethrum.
460. Peony.

BEDDING PLANTS.

461. Mrs. Pollock Geranium (leaf).
462. Pelargonium.
462*a*. Pelargonium.
463. Calceolaria.
464. Lobelia.
465. Petunia.
466. Ageratum mexicanum.
467. Verbena.
468. Heliotrope.
469. Salvia patens.
470. Datura arborea.
471. Pyrethrum Parthenium.
472. Coleus.
473. Amaranthus salicifolius.
474. Echeverja metallica.
474*a*. Echeveria sanguinea.
475. Gazania.

ANNUALS.

476. Nemophila.
476*a*. Clarkia.
477. Early Sweet Pea.

FIG.
477*a*. Convolvulus major.
478. Coreopsis tinctoria.
478*a*. Venus's Looking-glass.
479. African Marigold, orange double.
480. African Marigold, single.
481. Zinnia elegans.
482. Stock.
483. Mignonette.
484. Everlasting.
485. Sunflower.
486. Dianthus chinensis.
487. Phlox Drummondii.
488. Chilian Beet.
489. Indian Corn.
490. French Tasselled Aster.
491. German Quilled Aster.
492. Garden Scabious.
493. Convolvulus minor.
494. Sweet Sultan.

BIENNIALS.

495. Evening Primrose.
496. Castor Oil Plant.
497. Annual Larkspur.
498. Portulaca Thellusonii.
499. Foxglove.
500. Mimulus.
501. Horn Poppy.
502. Canterbury Bell.
503. Sweet William.

GREENHOUSE PLANTS.

504. Camellia.
505. Azalea indica.
506. Epacris.
507. Erica.
508. Daphne indica.
509. Franciscea latifolia.
509*a*. Tea-tree.
510. Lasiandra.
511. Balsam of Peru.
511*a*. Camphor-tree.
512. Acacia longifolia.
513. Fuchsia.
514. Metrosideros speciosus.
515. Mimosa.
516. Cineraria.
517. Impatiens Balsamina.
517*a*. Cuscuta reflexa.
518. Rondeletia speciosa.
519. Belladonna Lily.
520. Whitby Lily.
521. Cyclamen.
522. Mesembryanthemum.
523. Echinocactus tubiflorus.
524. Cereus grandiflorus.
524*a*. Stapelia Plantii.
525. Cereus speciosissimus.
526. Epiphyllum truncatum.
527. Primula sinensis.
528. Primula denticulata.
529. Dionæa muscipula.
530. Darlingtonia californica.
531. Cephalotus follicularis.
532. Aponogeton dystachyon.
533. Vallisneria spiralis.
533*a*. Nymphæa cærulea.

STOVE PLANTS.

FIG.
534. Torenia asiatica.
535. Tradescantia discolor.
536. Variegated Pine.
537. Begonia.
537*a*. Fittonia argyrea.
538. Begonia Rex.
539. Maranta zebrina.
540. Croton angustifolium.
541. Alocacia metallica.
541*a*. Bertolonia maculata.
542. Gloxinias. .
543. Pancratium zeylanicum.
544. Achimenes.
545. Caladium argyrites.
546. Eucharis amazonica.
547. Semaphore plant.
548. Gardenia florida.
549. Poinsettia pulcherrima.

ROSES.

550. Scotch Rose.
551. Persian Yellow Rose.
552. Baroness Adolphe de Rothschild.
552*a*. Duke of Edinburgh.
553. General Miloradowitsch.
554. Clovis.
555. Madame Barriot.
555*a*. La France.
556. Centifolia rosea.
557. John Hopper.
557*a*. Marquise de Mortmarte.
558. Princess Louise Victoria.
559. Pyramid Rose-tree.
559*a*. China Rose.
560. Fairy Rose.
561. Souvenir de Malmaison.
562. White Noisette Rose.
563. Yellow Banksian Rose.
563*a*. Macartney's Rose.
564. Gloire de Dijon.
565. Marshal Niel.
565*a*. Mademoiselle Marie Sisley.
566. Climbing Devoniensis.
567. Moss Rose.
568. Félicité Perpetuelle.
569. Dundee Rambler.
569*a*. Rosa canina.
569*b*. Rosa spinosissima.

CLIMBING PLANTS.

570. New Silver Edge Ivy.
571. Gold Striped Ivy.
572. Old Silver Edge Ivy.
573. Elegantissima.
573*a*. Virginian Creeper.
574. Wild Rose-coloured Convolvulus.
574*a* I. Horsfalliæ.
575. Glycine sinensis.
576. Lithospermum scandens.
577. Sweet-scented Clematis.
578. C. Jackmanni.

FIG.
579. C. lanuginosa.
580. Pale Clematis.
581. Lonicera fragrantissima.
582. Early Dutch Honeysuckle.
583. Late Dutch Honeysuckle.
584. Japanese Honeysuckle.
585. Jasminum nudiflorum.
586. White Jasmine.
587. Cissus discolor.
588. Cobœa scandens variegata.
589. Tropæolum speciosum.
590. Canary Creeper.
591. Gloriosa.
591*a*. Tacsonia Van Volxemii.
592. Æschynanthus.
593. Aristolochia brasiliensis.
594. Clianthus.
595. Passiflora Kermesina.
596. Hoya carnosa.
597. Hoya bella.
597*a*. Hoya campanulata.
598. Combretum purpureum.
599. Clerodendrum splendens.
600. C. Balfourii.
600*a*. Thunbergia alata.
601. Stephanotis floribunda.
602. Mandevilla suaveolens.
602*a*. Bougainvillea speciosum.
603. Stigmaphyllon ciliatum.
603*a*. Hop.
604. Abutilon vexillarium.
605. Thunbergia laurifolia.
606. Lapageria rosea.
607. Dipladenia amabilis.
607*a*. Calystegia pubescens.
608. Allamanda Hendersonii.

ORCHIDS.

609. Orchis mascula.
610. Bee Orchid.
611. Fly Orchid.
612. Man Orchid.
613. Great Butterfly Orchid.
614. Orchis maculata.
615. Orchis incarnata.
616. Goodyera repens.
617. Cypripedium Calceolus.
618. Dendrobium nobile.
618*a*. Disa grandiflora.
619. D. Pierardii.
620. Dendrobium.
620*a*. Lælia anceps.
621. Phalænopsis grandiflora.
622. Vanda.
623. Oncidium papilio.
624. O. altissimum.
625. Oncidium flexuosum
626. O. Harrisii.
626*a*. O luridum
626*b*. O. ampliatum.

FIG.
627. Mantisia saltatoria.
628. Phajus grandiflora.
629. Cattleya Mossiæ.
630. C. Skinneri.
630*a*. C. crispa.
631. Maxillaria fimbriata.
632. Lycaste aromatica.
633. Cypripedium villosum.
634. Brassia maculata.
635. Stanhopea.
636. Aërides crispum.
637. Ten species of Anæctochilus.
638. Calanthe vestita.
638*a*. Tricopilia tortilis.
639. Odontoglossum grande.
640. O. Alexandriæ.
641. O. Phalænopsis.
642. Miltonia.
643. Dove Orchid.
644. Angræcum sesquipedale.
645. Masdevallia Veitchii.
646. Vanilla.
647. Cælogyne cristata.
648. N. Rafflesiana.

ALPINE PLANTS.

649. Saxifraga oppositifolia.
650. S. granulata.
651. Ditto (double).
652. S. intacta minor.
653. S. Geum.
654. S. pectinata.
655. S. bryoides.
656. S. aspera.
657. S. globifera.
658. S. cæspitosa.
658*a*. Saxifraga Hirculus.
659. Sedum anglicum.
660. S. Sieboldii.
661. S. Fabaria, or S. spectabile.
661. Sempervivum tectorum.
662. Sempervivum montanum.
663. S. californicum.
664. S. arachnoideum.
665. S. spinosum.
666. S. tabulæforme.
667. S. Bollii.
668. Echeveria secunda.
669. Pachyphytum bractensum.
670. Cotyledon umbilicus.
671. Scilla sibirica.
672. Scilla bifolia.
673. Bulbocodium vernum.
674. Colchicum autumnale.
675. Anemone nemorosa.
676. Ditto (double).
677. Purple Anemone of Italy.
678. A. apennina.
679. A. pulsatilla.
680. A. palmata.
681. Camassia esculenta.
682. Allium nutans.
683. Oxalis rosea.
684. Tulip from Italy.
685. Lily of the Field.
686. Iris nudicaulis.
687. Triteleia uniflora.
688. Erica herbacea.
689. Menziesia polifolia.
690. Alpine Rose.
691. Linnæa borealis.
692. Omphalodes verna.
693. Myosotis dissitiflora.
694. M. rupicola.
695. Veronica maritima.
696. Veronica repens.
697. Trillium grandiflorum.
698. Maianthemum bifolium.
699. Pinguicula vulgaris.
700. Parnassia palustris.
701 Silene acaulis.
702. S. alpestris.
703. Mazus pumilio.
704. Epimedium rubrum.
705. Helianthemum vulgare.
706. Thalictrum minus.
707. Alyssum alpestre.
708. Yellow Poppy.
709. Dianthus chinensis.
710. D. fragrans.
710*a*. Dianthus Cæsius.
711. Statice latifolia.
712. Alpine Snapdragon.
713. Linaria tristis.
714. A. Novæ Zelandiæ.
715. Arenaria balearica.
716. Pentstemon glaber.
717. Aphyllanthes Monspeliensis.
718. Phlox divaricata.
719 Phlox Nelsonii.
720. Cheiranthus alpinus.
721. Gentiana acaulis.
722. G. verna.
723. G. gelida.
724. Campanula persicifolia.
725. Campanula coronata alba.
726. C. rotundifolia.
727. C. hirsuta.
728. Abyssinian Primrose.
729. Primula cortusoides.
730. P. villosa.
731. P. auricula.
731*a*. Soldanella alpina.
732. French Everlasting.
733. Geum montanum.
734. Draba beotica.
735. Aubrietia Cambelli.
736. Dodecatheon Meadia.
737. Erigeron speciosus.
738. Genista sagittalis.
739. Polygala Chamæbuxus.
740. Linum flavum.
741. Solidago cambrica.
742. Trollius europæus.
742*a*. Gnaphalum leontopodium.
743. Vicia Cracca.
744. Rubus saxatilis.
745. Drosera rotundifolia.
746. Bog Bean.
747. Calla palustris.
748. Hippuris vulgaris.

GRASSES.

749. Briza maxima.
750. Anthoxanthum odoratum.
751. Stipa pinnata.
752. Lagurus ovatus.
753. Water Grass.
754. Common Reed.
755. Variegated Grass.
756. Couch Grass.
757. Cock's-foot Grass.
758. Carex pendula.

WEEDS AND WILD PLANTS.

FIG.
759. Ranunculus ficaria.
760. Caltha palustris.
761. Yellow Water Iris.
762. Bulrush.
763. Purple Loosestrife.
764. Figwort.
765. Flowering Rush.
766. Frog-bit.
767. Speedwell.
768. Chrysanthemum segetum.
769. Lysimachia nummularia.
770. Spiræa ulmaria.
771. Malva sylvestris.
772. Datura Stramonium.
773. Myosotis palustris.
774. Water Ranunculus.
774*a*. Sium angustifolium.
774*b*. Poisonous Roots of Water Parsnip (Œnanthe).
775. Chrysosplenium oppositifolium.
776. Ivy-leaved Duckweed.
777. Lesser Duckweed.
778. Callitriche.
779. Sagittaria sagittifolia.
780. Alisma Plantago.
781. Epilobium hirsutum.
782. Water Soldier.
783. Hydrocotile vulgare.
783*a*. Damasonium stellatum.
784. Anacharis.
785. Bryonia dioica.
786. Solanum dulcamara.
787. Convolvulus arvensis.
788. Potentilla Anserina.
789. Arum maculatum.
790. Water Dock.
791. Lesser Dodder.

ALGÆ.

792. Protococcus viridis.
793. Ditto, magnified.
794. Lyngbya muralis.
795. Ditto, magnified.
796. Nostoc commune.
797. Conferva rivularis.
798. Ditto, magnified.
799. Conferva.
800. Cladophora crispata.
801. Batrachospermum moniliforme.
802. Cladophora glomerata.
803. Draparnaldia glomerata.
804. Tetraspora lubrica.
805. Zygnema spiralis.
806. Conjugation of confervæ.
807. Closterium Leibleinii.
808. Epithemia turgida.
809. Surinella biscriata.
810. Cocconema lanceolatum.
811. Pinnularia major.
812. Cymelophura solea.
813. Pleurosigma attenuatum.
814. Campylodiscus spiralis

MOSSES AND LICHENS.

815. Fontinalis antipyretica.
816. Funaria hygrometrica.
817. Mnium undulatum.
818. Mnium cuspidatum.
819. Sphagnum acutifolium.
820. Hypnum ruscifolium
820*a*. Hypnum splendens.
821. Ramalina fastigiata.
822. Physcia parietina.
823. Lecanora subfusca.
824. Marchantia.

FUNGI.

825. Torula cerevisiæ.
826. Blue Mould.
827. Trametes gibbosa.
828. Agaricus euosmus.
829. Tubercularia vulgaris.
830. Lycogala epidendrum.
830*a*. Agaricus Candolleanus.
831. Agaricus disseminatus.
832. Peziza vesiculosa.
833. Mushroom.
834. Cells of Mushroom.
835. Champignon.
835*a*. Ergot of Rye.
836. Agaricus fascicularis.
837. Morel.
838. Morchella crassipes.
839. Giant Puff-ball.
840. Phallus impudicus.
841. Dacrymyces stillatus and spores.
842. Æcidium violæ.
843. Æcidium cydoniæ.
844. Potato Fungus.
844*a*. Peronospora viciæ (magnified).
845. Lettuce Mould.
846. Acremonium.
847. Oïdium Tuckeri.
848. Erysiphe Martii, with spores.
848*a*. Polyporus squamosus.
849. Sphærotheca pannosa, with spores.
850. Coleosporium pingue.
851. Cystopus candidus.
851*a*. Coprinus atramentarius.
852. Puccinia lychnidearum.
853. Helminthosporium pyrorum.
854. Siberian Crab Fungus.
854*a*. Tuber æstivum.
855. Uredo filicum.
856. Oïdium fructigenum.
857. Dry-rot.
857*a*. Trametes suaveolens.
858. Sarcina ventriculi.
859. Saprolegnea on Ovum.
860. Ascomyces deformans.

FERNS AND THEIR ALLIES.

861. Hymenophyllum demissum.
862. Adiantum Capillus-Veneris.
863. Hymenophyllum Tunbridgense.

FIG.
863*a*. Hymenophyllum Wilsoni.
864. Killarney Fern.
865. Sporangia of T. speciosum.
866. Asplenium germanicum.
867. Scolopendrium vulgare
868. Ceterach officinarum.
869. Cystopteris montana.
870. Polypody.
870*a*. Oak Fern.
871. Parsley Fern.
872. Scalariform vessels in Bracken.
873. Polystichum angulare.
873*a*. Blechnum spicant.
874. Holly Fern.
875. L. Filix-mas.
876. Marsh Fern.
877. Athyrium Filix-fœmina.
878. Sporangia of O. regalis.
879. Moon Wort.
880. Adder's Tongue.
881. Osmunda gracilis.
882. O. interrupta.
883. Cystopteris bulbifera.
883*a*. Pteris rotundifolia.
884. Pteris scaberula.
884*a*. Aspienium goldianum (var. pictum).
885. Lastræa Standishii.
886. Lomaria chilensis.
887. Struthiopteris germanica.
887*a*. Onychium sensibile.
888. Cyathea medullaris.
889. C. Schiedei.
890. Alsophila australis.
891. Dicksonia squarrosa.
892. Dicksonia Barometz.
893. Tartarian Lamb.
894. Trichomanes Luschnatianum.
895. T. reniforme.
896. Hypolepis repens.
897. Cheilanthes elegans
897*a*. Onychium japonicum.
898. Platyloma flexuosa.
899. Pteris tricolor.
900. Davallia bullata.
900*a*. Lindsæa cultrata.
901. Adiantum reniforme.
902. A. Farleyense.
903. A. cuneatum.
904. A fulvum.
905. Lomaria gibba.
906. Blechnum orientale
907. Woodwardia radicans.
908. Doodia aspera.
909. Asplenium.
910. Bird's-nest Fern.
910*a*. Camptosorus rhizophyllus.
911. Actiniopteris radiata.
912. Didymochlæna lunulata.
913. Nephrodium molle.
914. Oleandra articulata.
915. Polypodium verrucosum.
916. Polypodium filipes.
917. Gymnogramma chrysophylla.
918. Meniscium simplex.

FIG.
919. Acrostichum crinitum.
920. Platycerium alcicorne.
920*a*. Platycerium grande.
921. Todea superba.
922. Sporangia of Todea.
922*a*. Lygodium palmatum.
923. Lygodium scandens.
924. Anemia fraxinifolia.
925. Angiopteris evecta.
926. Marattia laxa.
927. Prothallus.
928. Lycopodium selago.
929. Nardoo plant.
930. Selaginella denticulata.
931. S. Lyallii.
932. Equisetum sylvaticum.

TREES AND SHRUBS.

933. Elm.
934. Black Italian Poplar.
934*a*. Lombardy Poplar.
935. Old Black Poplar.
935*a*. Aspen.
936. White Poplar.
937. Horse-chestnut.
938. Lime.
939. Last Oak of Birnam Wood.
940. Turkey Oak at Fulham, struck by lightning.
941. White Willow.
942. Alder.
943. Mountain Ash.
944. Copper Beech.
944*a*. Pendulus Beech.
945. Birch.
946. Last Sycamore of Birnam Wood.
947. Plane Tree.
948. Laburnum Blossom.
949. Arbutus unedo.
949*a*. Maidenhair tree.
950. Red May.
951. Lemon Verbena.
952. Yew.
953. Holly.
953*a*. Tulip-tree.
954. Magnolia.
955. Catalpa.
956. Hardy Palm.
957. Cones of Picea nobilis.
958. Cedars of Lebanon and Elm.
959. Cones of Cedar of Lebanon.
960. Wellingtonia gigantea.
961. The "Father of the Forest."
961*a*. Cone of Wellingtonia gigantea.
962. "George Washington."
962*a*. Araucaria Imbricata.
963. Larch in Beddington Park.
964. Larch at Dunkeld.
964*a*. Cupressus sempervirens.
965. Cupressus Lawsoniana.
966 Taxodium Distichum.
967. Walnut-tree.
968. Laurel.

FIG.
969. Lilac.
970. Mock Orange.
971. Japan Quince.
972. Red Flowering Currant.
973. Berberis dulcis.
974. Guelder Rose.
975. St. John's Wort.
975*a*. Skimmia japonica.
976. Scarlet Rhododendron.
977. Yellow Azalea.
978. Kalmia latifolia.
979. Andromeda speciosa
980. Venetian Sumach.
981. Bog Myrtle.
982. Myrtus communis.
983. Heather.

ANIMALCULES, ETC.

984. Amœbæ.
985. Monads.
986. Siagontherium tenue.
987. Bursaria vernalis.
988. Stylonichia.
989. Vaginicola.
990. Vorticella.
991. Melicerta ringens.
992. Hydra communis.

WORMS AND CRUSTACEA, ETC.

993. Earth or Lob Worm
994. Fresh-water Sponge
995. Fresh-water Shrimp
996. Woodlouse.
997. Cyclops quadricornis.
998. Ditto, side view.
999. Daphne Pulex.
1000. Parasite of the Ox.

ENTOZOA.

1001. Egg of Beef Tapeworm.
1002. Beef Measles.
1003. Beef Tapeworm.
1004. Head of Beef Tapeworm
1005. Head of Tænia solium.
1006. Pork Measles.
1007. Cysticercus cellulosus.
1008. Hydatid Tapeworm.
1009. Hairworm.

ACARI, SPIDERS, ETC.

1010. Tyroglyphus farinæ.
1011. Red Spider.
1012. Harvest Bug.
1013. Garden Spider.
1014. Web of the Angelina labyrintheca.
1015. Centipedes.
1016. Millipedes.

INSECTS.

1017. Working Honey Bee.
1018. Humble Bees.
1019. Common Wasp and Gnat.
1020. Wasp's Nest.
1021. Hornet's Nest.
1022. Aphidius rapæ.
1023. Colax dispar.

FIG.
1024. Pemphredon unicolor.
1025. Rose-leaf and Larva of Rose Saw-fly.
1026. Tenthredo rosarum.
1026*a*. Pear-tree Saw-fly.
1027. Sirex gigas.
1028. Gall on Oak.
1028*a*. Cynips terminalis.
1029. Red-breast's Pincushion.
1030. Black Ant.
1031. Cockchafer.
1032. Rose Chafer.
1033. Balaninus nucum.
1034. Bruchus Pisi.
1035. Scolytus destructor.
1036. Anthonomus pomorum.
1037. Wire-worm.
1038. Turnip Fly.
1039. Devil's Coach-horse.
1040. Lady-bird.
1041. Cockroach.
1042. Earwig.
1043. Lygus solani and Lygus umbellatarum.
1044. Pentatoma oleaceum.
1045. Aphis vastator.
1046. Aphis Dianthi.
1046*a*. Lettuce-root Aphis.
1047. A. rapæ and A. floris rapæ (Curtis).
1048 Aphides on potato-leaf.
1049. Black Aphis.
1050. Plum Aphis.
1051. Pea Aphis.
1052. American Blight.
1053. Currant-leaf with Aphides.
1054. Aphis quercus.
1054*a*. Coccus vitis.
1054*b*. Coccus Bromeliæ.
1055. Coccus adonidum.
1056. Lemon Coccus.
1057. Larva Thrips.
1058. Winged Thrips.
1059. Chrysopa perla.
1060. Larva of C. perla.
1060*a*. Caddis (larva).
1060*b*. Caddis (perfect insect).
1061. Caddis-worms.
1062. Fossil Cadbaits.
1063. Small Cadbaits.
1064. Pieris brassicæ and Pteromalus brassicæ.
1065. Caterpillar of Goat Moth.
1066. Apple-stem eaten by Goat Moth.
1067. Caterpillar of Wood Leopard Moth.
1068. Lackey Moth.
1069. Caterpillar, Eggs, and Cocoon of Lackey Moth.
1070. Caterpillar of Brown-tailed Moth
1071. Magpie Moth.
1072. Codlin Moth.
1073. Tortrix pruniana.
1074. Great Yellow Underwing.
1075. Caterpillar of Noctua (mamestra) brassicæ.
1076. N. exclamationis.
1077. Caterpillar of Hybernia defoliaria.

FIG.
1078. Scæva balteata, S. pyrastri, and S. ribesii.
1079. Daddy Long-legs.
1080. Trichocera hiemalis
1081. Celery affected with leaf-mining Larvæ
1082. Carrot Fly.
1083. Pear with Larvæ.
1084. Onion Fly.

SLUGS AND SNAILS.

1085. Black Slug.
1086. Common Garden Snail.
1087. Helix Pomatia.
1088. Girdled Shell.
1089. Zonites crystallinus.
1090. Succinea putris.
1091. Limnæus Pereger.
1092. River Limpet.
1093. Planorbis vortex.
1094. Cyclas cornea.
1095. Bithinia ventricosa.
1096. Valvata piscinalis.

FISH, ETC.

1097. Trout.
1098. Fish-tray.
1099. Fish-house.
1100. Flies: 1, Quill Gnat; 2, Black Gnat; 3, Carshalton Cocktail; 4, Emperor; 5, Coachman: 6, Coch-y-bonddhu.

FIG.
1101. Eel Trap.
1102. Lampern.
1103. Structure of Cartilage in the Lampern.
1104. Bullhead.
1105. Dace.
1106. Stickleback.
1107. Stickleback's Nest.

REPTILES.

1108. Frog.
1109. Toad.

GARDEN ANIMALS.

1110. Squirrel.
1111. Hedgehog.
1112. Mole.
1113. Water Rat.
1114. Brown Rat
1115. Domestic Mouse.
1116. Field Mouse.
1117. Harvest Mouse.
1118. Short-tailed Campagnol.
1119. Shrew Mouse.
1120. Water Shrew.
1121. Stoat.
1122. Weasel.

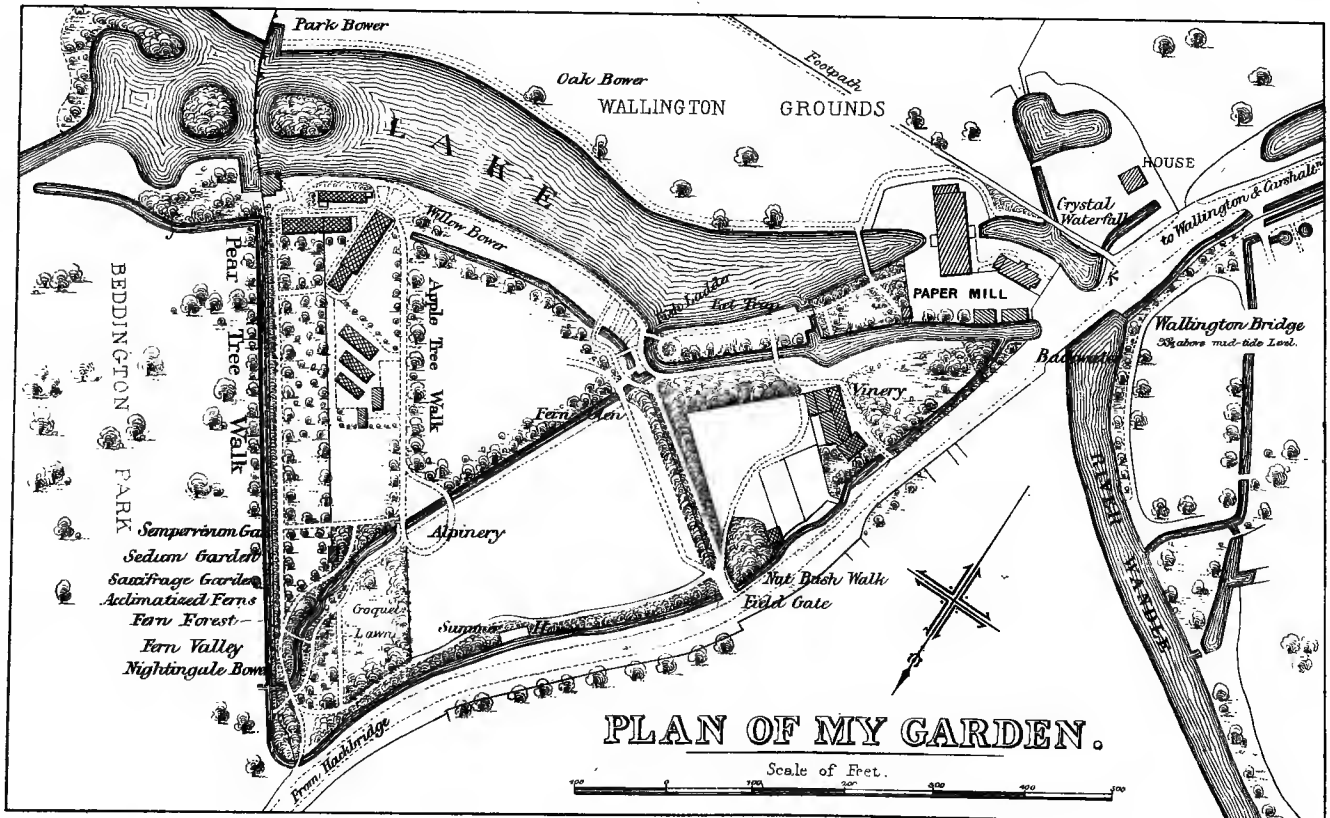
BIRDS, ETC.

1123. Hooper Swan.
1124. Common Swan.
1124a. Head of Swan.
1125. Wild Duck.
1126. Teal.
1127. Widgeon.

FIG.
1128. Tufted Duck.
1129. Smew or Smee Duck.
1130. Little Grebe.
1131. Sclavonian Grebe.
1132. Water Rail.
1133. Land Rail.
1134. Moorhen.
1135. Moorhen's Nest.
1136. Bald-faced Coot.
1137. Heron.
1138. Woodcock.
1139. Common Snipe.
1140. Jack Snipe.
1141. Sandpiper.
1142. Peewit.
1143. Partridge.
1144. Turtle Dove.
1145. Wood Pigeon.
1146. Swift.
1147. Sand Martin.
1148. House Martin.
1149. Swallow.
1150. Swallow's Nest.
1151. Kingfisher.
1152. Cuckoo.
1153. Nuthatch.
1154. Wren.
1155. Wren's Nest.
1156. Creeper.
1157. Wryneck.
1158. Spotted Woodpecker.
1159. Jay.
1160. Magpie.
1161. Jackdaw.
1162. Head of Crow.
1163. Rook.

FIG.
1164. Starling.
1165. Bullfinch.
1166. Linnet.
1167. Goldfinch.
1168. Hawfinch.
1169. Greenfinch.
1170. House Sparrow.
1171. Chaffinch.
1172. Skylark.
1173. Wagtail.
1174. Blue Titmouse.
1175. Greater Titmouse.
1176. Cole Titmouse.
1177. Long-tailed Titmouse.
1178. Golden-crested Wren.
1179. Sedge Warbler.
1180. Reed Warbler.
1181. Reed Warbler's Nest.
1182. Ditto.
1183. Blackcap.
1184. Chiffchaff.
1185. Nightingale.
1186. Stonechat.
1187. Wheatear.
1188. Redbreast.
1189. Missel Thrush.
1190. Fieldfare.
1191. Redwing.
1192. Song Thrush.
1193. Blackbird.
1194. Spotted Flycatcher.
1195. Kestrel.
1196. White Owl.
1197. Effect of Frost on Cherry Blossoms.

Vign. III.—Wallington Church.


Park Bower
Oak Bower
Footpath
WALLINGTON GROUNDS
LAKE
HOUSE
Crystal Waterfall
to Wallington & Carshalton
Willow Bower
Pear Tree Walk
Apple Tree Walk
Fern Bower
PAPER MILL
Wallington Bridge
35 ft above mid-tide Level
Vinery
Fern Men
BEDDINGTON PARK
Alpinery
Semperivum Ga
Sedum Garden
Saxifrage Garden
Acclimatized Ferns
Fern Forest
Fern Valley
Nightingale Bow
Croquet Lawn
Summer
Nut Bush Walk
Field Gate
RIVER WANDLE
From Hackbridge
PLAN OF MY GARDEN.
Scale of Feet.

Vign. IV.—Beddington Church.

MY GARDEN.

"Der Garten ist einfach, und man fühlt gleich bei dem Eintritte, dass nicht ein wissenschaftlicher Gärtner, sondern ein fühlendes Herz den Plan gezeichnet, das seiner selbst hier geniessen wollte."—GOETHE, *Leiden des Jungen Werther's.*

CHAPTER I.

SITUATION OF MY GARDEN.

MY garden (plate 2) is situated at Wallington Bridge, in the hamlet of Wallington, in the parish of Beddington, in the county of Surrey (plate 3). According to the parish Ordnance map, this plot of ground[1] consists of 7·925 acres of land and water.

The parish of Beddington, in Domesday Book written Beddintone contains 3,951·091 acres; and the hamlet of Wallington is situated in the west side of the parish, and contains 823·089 acres.

I am informed by Dr. Farr that by the Census of 1871, not yet published, the population of Beddington amounted to 1,499, and that of Wallington to 1,335, making a total of the entire parish of Beddington of 2,834.

BEDDINGTON IN THE CELTIC PERIOD.

Flint instruments are found over the district, but not in great numbers. Mr. J. Wickham Flower of Croydon has a very fine collection.

[1] Plot 82, sheet xiii. 12.

and is an authority on the subject. He lent me a specimen to figure which was found at Croydon (fig. 1). He also found specimens of scrapers at Haling Park (fig. 2), which he regards as authentic. Mr. Cressingham also picked up a Celtic worked stone on the downs south of my garden (fig. 3). In Beddington Park numerous bronze celts have been found (vig. xxix.), all proving that the neighbourhood was early inhabited.

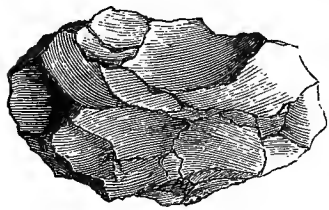


FIG. 1.

FIG. 2.

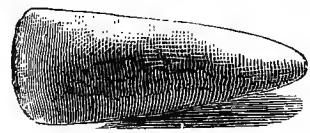


FIG. 3.

BEDDINGTON IN THE ROMAN PERIOD.

The evidence of Roman occupancy is distinct, and has received important confirmation by the discoveries made in the year 1871 by Mr. Addy, the resident engineer of the Croydon Board of Works. The foundations of one Roman house were exposed by workmen forming an irrigation canal. Mr. Addy at once, from its mode of construction,

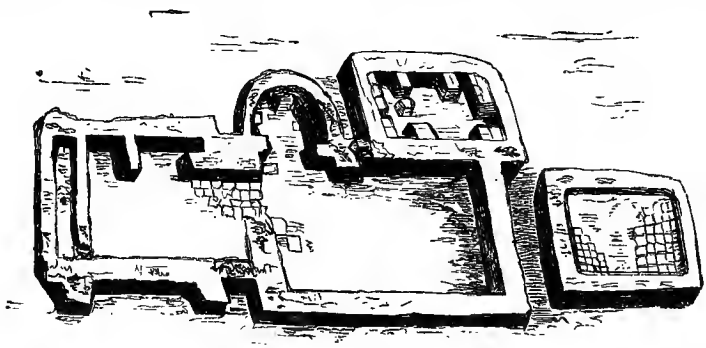


FIG. 4.—Roman House at Beddington.

knew it to be Roman, and carefully traced out the plan of the building. He made the annexed sketch (fig. 4), which is minutely accurate. The spot where the discovery was made is marked on the map (plate 3), on

the irrigation fields to the east of Beddington Park. The walls were composed of large flints, and flat Roman bricks set in mortar. The bricks were from 1½ to 2½ inches in thickness and 10 inches square.

Mr. Addy states, in a paper read before the Society of Antiquaries: "By reference to the plan, it will be seen that the buildings extend east and west from the large central chamber, the walls of which are more regular and thicker than any of the others, and probably this was the principal apartment of the building. This chamber was 16 feet by 10. At the east of this principal chamber was a rectangular apartment with the remains of a hypocaust for warming the building. The supports of the flooring of the hypocaust were clearly exposed, and are shown accurately on the plan."

To the north of this principal chamber a recess existed, and to the west, outer and partition walls, of a rougher construction, were uncovered, and are figured in the plan. The floor was paved with square bricks; but no trace of tesselated pavement was found.

The remains of the walls were 2 ft. below the surface of the ground; and the walls remaining were 1 ft. 9 in. from the foundation.

Amongst the *débris* were large quantities of plaster, marked in coloured bands from ¼ inch to 2 inches, chiefly of a crimson colour; sometimes, however, the stripes were sepia-coloured, and occasionally pieces were found coloured with yellow pigment. Large quantities of portions of flue tiles were found, showing the action of fire.

Various specimens of pottery of different kinds were discovered, and one piece, supposed by the learned to be unique, was marked with indentations as though impressed by shells (fig. 5). Only two coins were found in the building,—one a Roman coin, with Romulus and Remus on the reverse, the other a Saxon silver penny. A bronze bead (fig. 6) was also discovered in the *débris* of the building. The foundations of the Roman house are now covered; but we may hope that the

FIG. 5.

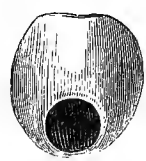


FIG. 6.

landowner, Mr. Beddington, may preserve them, that they may show to our children and our children's children the Roman occupancy of this part of the country, especially as there is reason to suppose that another Roman house existed, from many fragments of Roman bricks and vessels being found at a short distance from the first building.

In the *débris* of the Roman house was found an instrument (fig. 7) the use of which no English antiquary could determine; and no such thing is in the collection at the British Museum. I forwarded a drawing of it to M. d'Agiout at Naples. He consulted M. le commandeur Fiorelli, director, M. le commandeur Minervini, and M. le chevalier Nicolini, secretary, of the unrivalled Museum of Roman Antiquities. These gentlemen, by a careful comparison with the small bronzes, discovered that it agreed with a part of a game found at Herculaneum, somewhat like the "Jeu de Marelle," which was much played by the ancient Romans when they travelled, or when they were confined to the house. The object found at Beddington was the large piece of the game, in the form designed for the use of travellers. It must be regarded as a very interesting addition to the Roman objects found in Great Britain.

Fig. 7.

On the irrigation fields the following Roman coins were found by the workmen:—

1. Commodus (second brass); extremely corroded.

2. Constantine period. Obv. Head, to the right, of Rome or Constantinople; Rev. Victory.

3. Constantine period. (Constantius?) Much worn.

4. Constantine period (fig. 8). Obv. Head of Rome, Urbs Roma; Rev. Romulus and Remus; Mint mark, T R (Treves).

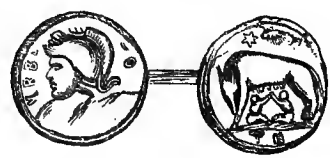


Fig. 8.

5. Allectus. Obv. Head of Allectus, to left, ALLECTUS; Rev. Galley, LAETITIA AUG, struck at Colchester.

6. A coin of Carausius? He reigned in Britain A.D. 287.

7 and 8. Roman coins not identified at present.

Besides these evidences of the residence of the Romans in the neighbourhood, a silver spoon, now in the possession of Mr. Cressingham, was found at Barrow Hedges, Carshalton (fig. 9). Fragments of Roman glass have been found at Wallington. Further south, at Woodcote, Roman remains have been described; and still further, at Walton-on-the-Heath, Lysons records that the remains of a Roman house were found in the year 1772.

FIG. 9.—Roman Spoon.

Various antiquaries have considered the Roman town Noviomagus, mentioned in the Itinerary of Antoninus, to have been situated at Woodcote, on the hills south of my garden. Camden assigns this situation to it because he considers that the distances agree with the statements in the Itinerary, and because it was described as the chief city of the Regni, a people of Surrey. Dr. Gale also placed it in that position, Gibson, Somner, Stillingfleet, Stukeley, and Baxter, on the other hand, consider that Noviomagus was at Crayford, because that position is in a straight line between Maidstone and London. Curiously enough, Sir Thomas Eliot places this city at Chester, Lilly at Buckingham, Lluyd at Guildford, and Talbot at Old Croydon. From these various statements it is manifest that the site of this Roman city is unknown, and I myself regard it as one of those problems which will never be unravelled unless some fresh discovery be made.

The Roman road called Stane Street, extending from the sea-coast to London, and thence by the Great Ermine Street to Scotland, through Lincoln, is supposed to have passed through or near Beddington parish, though no trace of it is now to be seen. It has been thought to leave Sussex; it reappears at Ockley, where it is marked in the Ordnance Survey map as running on the present turnpike road for two miles and a half. Some persons think that Stane Street passed north of Dorking, across Walton Heath, thence to Woodcote, and from this latter place to Streatham. Mr. Standish informs me that Stane Street is not mentioned in the Itinerary, nor does Richard of Cirencester, the mediæval authority on the subject, A.D. 1350 to 1400, allude to it. Sir Duffus Hardy, in his map of the Roman

roads, which I have copied (fig. 10), marks it as known from Chichester to Dorking, and supposititiously thence to Streatham. We may assume that its position at Beddington is now unknown, and that any attempt to locate it is merely a matter of conjecture. I have visited Woodcote Farm, which now belongs to J. P. Gassiot, Esq., V.P.R.S., and there is evidently a ridge running from Walton across his farm to Beddington, which would be convenient for a road; but at this moment there are no traces of a road, nor did the old people remember that, in late years, any traces of Roman antiquities had been found on that estate.

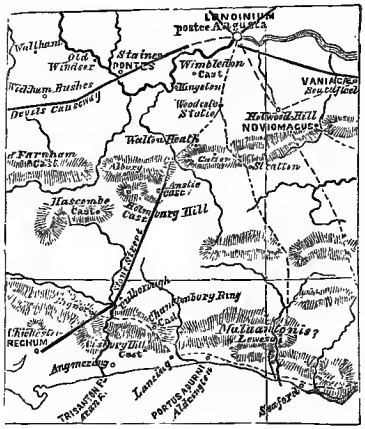


FIG. 10.

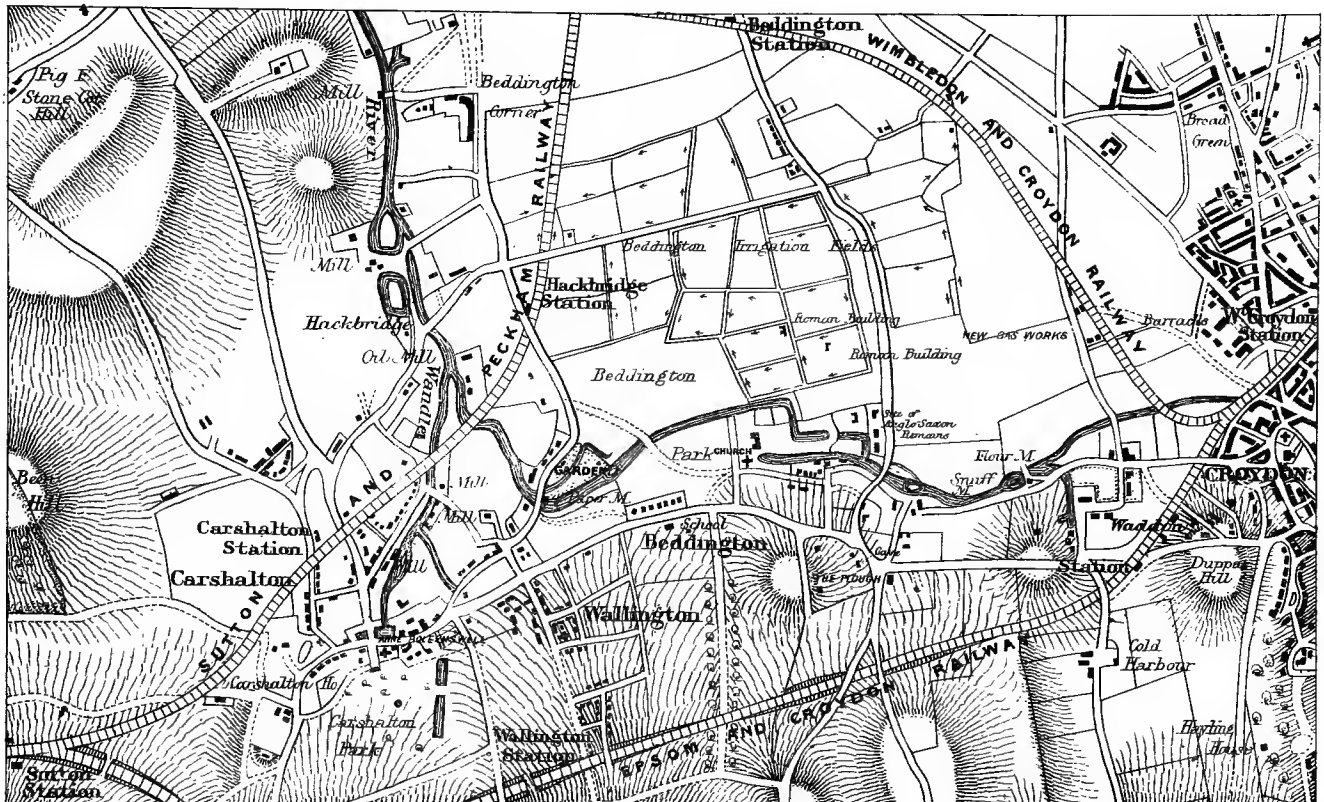
"The very generations of the dead
Are swept away, and tomb inherits tomb,
Until the memory of an age is fled,
And, buried, sinks beneath its offspring's doom."—BYRON.

BEDDINGTON IN THE ANGLO-SAXON PERIOD.

The proofs of Anglo-Saxon occupancy of Beddington recently received confirmation as conclusive as that afforded of Roman occupancy; for on the irrigation grounds Mr. Addy discovered in the earth over a raised plot of ground (plate 3), about five hundred yards from the Roman house, a number of Anglo-Saxon urns and implements. Many skeletons were found, the bones of which were mostly decomposed, except the skull and long bones. I ascertained that the bodies were buried with the head towards the west. On the same piece of ground, and alternating with these skeletons, a number of cinerary urns were discovered, filled with burnt ashes (fig. 11).

FIG. 11.

FIG. 12.—Umbone of Shield. Scale $\frac{1}{16}$" to a foot.


Beddington Station
WIMBLEDON AND CROYDON RAILWAY
Beddington Corner
Mill
River
Pig F.
Stone Cr. Hill
Mill
Hackbridge
Oil Mill
Wandle
PECKHAM RAILWAY
Hackbridge Station
Beddington
Irrigation Fields
Roman Building
Roman Building
NEW GAS WORKS
Barracks
Broad Green
W. Croydon Station
Park
CHURCH
Flour M.
Snuff M.
CROYDON
Waddon
Station
Duppa Hill
Cold Harbour
Hayline House
Carshalton Station
Carshalton
SUTTON AND
Mill
Mill
Mill
School
Beddington
Wallington
Carshalton Ho.
Carshalton Park
Wallington Station
EPSOM AND CROYDON RAILWAY
Sutton Station
Scale of Statute Miles.
Furlongs 8 7 6 5 4 3 2 1 0 1 Mile

Most of the urns were so fragile that they broke in the attempt to remove them. There were also umbones of shields (fig. 12), and knives. The finest umbone of shield found by Mr. Flower I have figured, but the others were much corroded. The ground was not only turned over for the purposes of the irrigation works, but was further explored by Mr. Flower and myself; though doubtless many more objects remain for future antiquaries to discover.

The annexed figure of an Anglo-Saxon penny (fig. 13) was found on the irrigation works.

FIG. 13.—Saxon Silver Penny.
Obv. EDELSTAN RE + TODR +
Rev. EADMUND MOLEIECF +

FIG. 14.
Full size.

FIG. 15.—½ nat. size.

There are evidences that personal adornment was not forgotten by the Anglo-Saxons, as a blue glass bead was discovered (fig. 14), and also a bronze bracelet (fig. 15).

BEDDINGTON IN THE MEDIÆVAL PERIOD.

The mediæval history of Beddington is full of interesting matter. This place is mentioned in Domesday Book as containing two manors, one of which was held by Robert de Watevile of Richard de Tonebrige; and in later times his successors held it immediately of the king, by the service of rendering annually to the sovereign a wooden crossbow. In Domesday Book we find that there was at that time a church in this manor, and two mills are mentioned which were rated at forty shillings, equal to £120. In Richard the First's reign, the family of the De Eys, or De Es, were in possession of this manor; and William de Eys received from that sovereign ten shillings rent in Beddington. In 1205, this family having become extinct, the manor fell into the king's hands, and, for a time, certain persons were entrusted with its custody; but

by a deed made in 1245, Henry III. granted it to Raymund de Laik (Lucas), who likewise held it by a cross-bow. At his death, his daughter Isabella inherited the lands, and on her decease, after some litigation, her son Gatelier, or Gacelin, obtained possession of the property. From the Gatelier or Gacelin family this manor passed next into that of the Roges, and on that family becoming extinct in 1302 it again reverted to the sovereign. That same year Edward I. granted it to Thomas Corbet, who, some say, was his valet, and from him it passed successively, by purchase, to the Morleys, Braytons, and Willoughbys. But as these alienations were made without the king's consent, the manor was seized by Edward III.; he, however, re-granted it afterwards to Sir William Willoughby and his wife, although they were obliged to pay to the king a fine of one hundred shillings annually. They were allowed to let this manor in 1353 to William and Nicholas de Carru—as this family spelt their name at that time—at twenty marks per annum, on the agreement that the manor was to revert to the said Willoughby and his wife on the deaths of the tenants. And in 1360 the same Sir Wm. Willoughby also had licence to alienate the fee simple to Nicholas de Carru and his heirs; the value of it being one hundred shillings per annum. Sir Wm. Willoughby had but one daughter: she married Sir Thomas Huscarle, Knt., proprietor of the other manor in Beddington; and, on his death, she contracted another marriage with Nicholas de Carru. So that in the reign of Edward III. the two manors in Beddington became united. There is very little known about the manor of which Huscarle was the last proprietor. It is reorded in Domesday Book, that Milo Crispin Earl of Hereford held it, and that William son of Turold held it of him. Two mills are also mentioned as being in it, of the value of thirty-five shillings (£105). It seems that so early as the reign of King John the Huscarles possessed land in Beddington. The Carews, to whom the two manors belonged, on the marriage of Nicholas de Carru with Lucy, daughter of Sir William Willoughby, and widow of Sir Thomas Huscarle, are descended from one Otho, who came over to England in the Conqueror's time. The name of Carru was taken by one William, in the reign of King John, from a castle in Pembrokeshire called Carrio

or Carru; the spelling of that name being changed to Carew in Henry the Seventh's reign. Their arms are, Or, three lions passant in pale sable. The Carews can boast of several distinguished men belonging to their family, among whom ranks the celebrated historian Giraldus, commonly known by the addition of Cambrensis. Sir Nicholas Carew, the first owner of Beddington, was also a personage of some importance, being not only one of the knights of the shire, but also the Keeper of the Privy Seal in Edward the Third's reign, as well as one of the executors of that monarch's will. Other houses with lands, or small manors,—as they were sometimes called when belonging to religious bodies,—had, at different times, become the property of the Carews. Amongst these were the Frères Manor, which formerly belonged to the Hospital of St. Thomas, Southwark, and the Foresters Manor. These came to the same family at a very early period. The manor of Beddington continued in the Carew family until the reign of Henry VIII., when Sir Nicholas Carew, Lieutenant of Calais, Master of the Horse, and one of the Knights of the Garter, incurred the displeasure of that puissant monarch, and, being attainted of high treason, was beheaded on Tower Hill in 1539, and buried in St. Botolph, Aldgate. All the lands at Beddington were then seized by the king, who appointed Michael Stanhope keeper of the Manor-house. During this time Henry VIII. is said to have frequently resided at the Manor-house, and in 1541 he held a council there. Subsequently Walter Gorges obtained, for his life, the Manor of Beddington from Henry, and in the following reign the manor, mansion, and church with lands, were granted to Thomas Lord Darcy of Chiche, in exchange for other lands which Darcy had ceded to the king. From Queen Mary, in whose service he was, Sir Francis Carew obtained restitution of all his father's estates, but he prudently did not rest satisfied with the mere grant of the queen, but gave a sum of money to Darcy to cede the lands to him. It was this Sir Francis Carew who rebuilt the mansion of which now the great hall alone remains. The great door of this hall has a curious ancient lock very richly wrought, the keyhole of which is concealed by a shield bearing the arms of England. Queen Elizabeth honoured Sir Francis

Carew with her presence at Beddington in August 1599, and stayed three days at the mansion. She paid another visit the following August. The following quaint account by Sir Hugh Platt shows what pains were taken to keep back cherries (a favourite fruit of that sovereign) for her Majesty's entertainment:—

"Here I will conclude with a conceit of that delicate knight, Sir Francis Carew; who, for the better accomplishment of his royall entertainment of our late Queen of happy memory, at his house at Beddington, led her Majesty to a cherry tree, whose fruit he had of purpose kept back from ripening, at the least one month after all cherries had taken their farewell of England. This secret he performed, by straining a tent or cover of canvas over the whole tree, and wetting the same now and then with a scoop or horn, as the heat of the weather required; and so, by withholding the sun-beames from reflecting upon the berries, they grew both great, and were very long before they had gotten their cherry colour: and when he was assured of her Majesties comming, he removed the tent, and a few sunny dayes brought them to their full maturity."[1]

This Sir Francis Carew had a fine garden laid out at Beddington, and it was he who was the first to cultivate orange-trees in England. They are supposed to have been brought to this country by Sir Walter Raleigh, who had married Sir Francis's niece. In the *Archæologia* is an account of the orangery at Beddington, which I here subjoin:—

"Beddington Gardens, at present in the hands of the Duke of Norfolk but belonging to the family of Carew, has in it the best orangery in England. The orange and lemon trees there grow in the ground, and have done so near one hundred years, as the gardener, an aged man, said he believed. There are a great number of them, the house wherein they are being above two hundred feet long; they are most of them thirteen feet high, and very full of fruit, the gardener not having taken off so many flowers this last summer as usually others do. He said, he gathered off them at least ten thousand oranges this last year. The heir of the family being but about five years of age, the trustees take care of the orangery, and this year they built a new house over them. There are some myrtles growing among them, but they look not well for want of trimming. The rest of the garden is all out of order, the orangery being the gardener's chief care; but it is capable of being made one of the best gardens in England, the soil being very agreeable, and a clear silver stream running through it."[2]

Sir Francis died unmarried on the 16th May, 1611, at the great age of 81. He left all his estates to his nephew, Sir Nicholas Throckmorton,

[1] "Garden of Eden," by Sir Hugh Platt, part ii. p. 22. London: 1660.

[2] *Archæologia*, vol. xii. p. 182. London: 1796.

who took the name and arms of Carew. Sir Walter Raleigh was beheaded in Sir N. Throckmorton's lifetime, and it was to him that the widow, his sister, wrote the following curious letter, praying him to allow the remains of her unfortunate husband to be buried in Beddington Church. Whether the request was refused I know not; at all events the body of Sir Walter Raleigh was buried in St. Margaret's Church, Westminster, while his head was sent to his son at West Horsley in Surrey, where it was interred:—

"To my best b . . . . . .
SUR NICHOLAS
CAREW, at
beddington.

"I DESIAR, good brother, that you will be plessed to let my berri the worthi boddi of my nobell hosbar Sur Walter Ralegh in your chorche at beddington; wher I desiar to be berred. The lordes have geven me his ded boddi, though thoy denied me his life. This nit hee shall be brought you with too or three of my men: let me her presently, "E. R. God hold me in my wites."[1]

The lands at Beddington remained in the same family until 1791, when Sir Nicholas Hackett Carew, baronet, left them for life to his only daughter, then at her death to the eldest son of John Fountain, Dean of York, and if he had no son (which he had not) they were then entailed by will on the eldest son of Richard Gee, Esq., of Orpington, Kent, who took the name and arms of the Carews. Thus the lineal descent of the Carew family has twice failed since their residence at Beddington.

BEDDINGTON CHURCH.

The parish church of Beddington adjoins the Hall. Aubrey, the historian, considered that it was built in the reign of Richard II. By Sir Nicholas Carru's will, which was proved in 1390, he leaves a legacy of £20 towards building the church at Beddington; by that, it may be supposed that it was built about this period. A church is, however, mentioned in Domesday Book as existing at this place, and it is said that there still exist some remains of the architecture of the eleventh and twelfth centuries. The church was reckoned by Aubrey to be

[1] Manning and Bray.

30 yards long and 11¾ yards in breadth. At the present time it consists of a nave, chancel, and three aisles; and it has a fine massive square tower at the west end. It seems that the chancel and one of the aisles were built at the commencement of the fifteenth century, while the tower, southern aisle, and porch at the southern door, towards the latter part of the same century. In 1851 the Rector, the Rev. James Hamilton, commenced the restoration of the church. In his time the galleries and ugly large square pews were taken away; and still more accommodation was afforded by the building of the extreme northern aisle. Since then, the present Rector, the Rev. Alexander H. Bridges, has continued, to a considerable extent, the good work of restoring and embellishing this fine old church, by employing all the means which the present knowledge of mediæval art affords. He has had the carving of the wooden roof much improved; and a new oak chancel-screen has been constructed, similar to the old one which shuts off the mortuary chapel on the southern side of the chancel. The east window is of painted glass; the sides of it are filled with mosaics, which represent the Twelve Apostles. Above the re-table,—which has also been restored,—are five different Scriptural subjects in glass mosaics. The centre one represents our Saviour in glory, with angels ministering, and on either side are four other subjects: 1st, The Annunciation; 2nd, The Adoration; 3rd, The Flight into Egypt; and 4th, Christ disputing with the Doctors. The reredos is entirely new, and is also of mosaics. The sedilia, with a piscina and credence, have been replaced, and the sacrarium, with its steps, have been laid with English and foreign marbles and serpentine. The old stalls and misereres, with the choir seats, which are old and of oak, have also been most judiciously restored. The organ is new, and is placed in the chancel, and has a curiously painted oak screen. The nave and aisles have also, by the munificence of the Rev. A. H. Bridges, aided by his parishioners, been restored and embellished. The walls are coloured and decorated in diaper, which gives a pleasing appearance. The west window is filled with painted glass of modern date. Near the south door is placed the font, which is an ancient square stone one, and has an inscription carved

round it. At the southern entrance is an old porch, and a new lych-gate made of oak has lately been added to the western side of the church.

In this church are some curious old brasses and monuments, most of which were erected to the memory of the Carews, the great owners of lands in this parish. In the time of Aubrey and of Lysons, there were many brasses extant in the chancel, where the Carews were formerly interred before the building of the mortuary chapel. There is still one large brass, quite perfect, in the chancel, with the figures of Nicholas Carru and of Isabella his wife. The woman's arms are two lions passant. This Nicholas Carew died in 1432, and was the son of that Carru who married Lucy Huscarle. On the adjoining stone are brass figures of two other members of the Carew family; they are, however, of much smaller size than the one above described. The chapel situated at the south-east corner of the chancel was erected in the sixteenth century. Sir Richard Carew, Lieutenant of Calais in the reigns of Henry VII. and Henry VIII., was the first to be interred in it; it is an altar tomb. Among the many other monuments in the chapel to this family, the one most worthy of notice is that to Sir Francis Carew. It is of black and Sienna marbles, supported by two Corinthian pillars; between these pillars lies the statue of a man in full armour, with a long inscription showing that it is the resting-place of Sir Francis Carew, and recording the fact of his having had the honour to entertain his royal mistress at his house at Beddington. In the front part of this monument are the figures of Sir Nicholas Throckmorton, his wife, with their five sons and two daughters, all in a kneeling posture. Admiral Sir Benjamin Hallowell, one of the heroes of the battle of the Nile, is also buried in this chapel.

There is another ancient brass, which is placed in the north aisle of the church; it is to a steward of Sir Nicholas Carew—Thomas Greenhill was his name; he was educated at Magdalen College, Oxford, and died in 1633.

Sir Nicholas Carru, the founder of the family at Beddington, and the husband of Lucy, daughter of Sir William Willoughby, directed

by will that his body should be buried in Beddington Church, between the grave of his brother John and the south door of the church. It was that one who left the bequest of £20 towards the rebuilding of St. Mary's: he willed that four fit chaplains were to be found, one of whom for ever, and others for five years, were to pray for his soul and all Christian souls of the church at Beddington. He willed also that thirteen torches and five tapers, each weighing six pounds at the most, were to be provided for his funeral; these were afterwards to be distributed at the discretion of the executors. The torches were to be borne by thirteen poor men, who were all to have new clothes for the occasion. This extraordinary will was proved at Croydon in 1390.

The advowson of St. Mary's was given in 1159 to the Priory of Bermondsey by Ingelram de Funteneys, or Fontibus, and Sibyl de Watevile, sister of William de Watevile, and wife of Adam de Pirot; and this grant was confirmed in the same year by Henry II., and later by Edward III. In 1246 the same Priory recovered an annual pension of 100 shillings payable to them out of this Rectory, as well as two marks sterling in lieu of tithes of land in the parish of Beddington. After the dissolution of the monasteries the advowson of the church was granted by Henry VIII. to the Carews, in which family it remained until the year 1859.

The living of Beddington—which is a rectory situated in the deanery of Ewell, and is in the diocese of Winchester—produces at the present time about £1,250 a year. The advowson was sold by the Carew family during the lifetime of the Rev. James Hamilton to Mr. Raincock for £8,500. Shortly afterwards the Rev. James Hamilton died, when the Rev. Dr. Marsh was appointed rector. During the lifetime of Dr. Marsh the advowson was again sold to Sir Henry Bridges for £17,000, and on the death of Dr. Marsh, at the great age of 86, the Rev. A. H. Bridges was appointed to the living.

There was also a sinecure benefice to the church, called a free portion, the patronage of which was annexed to Huscarle's manor. It was valued in 1291 at 15 marks; two of them were paid, as already

observed, to the Priory of Bermondsey. A commission having been issued in 1473 by the Bishop of Winchester, to inquire into the nature and profits of this portion, it was found that the clear profits were then estimated at 40 shillings. This portion also passed later to the Carews, and it appears to have consisted of the tithes of 200 acres of land called Huscarle's Fewde, situated on the north side of the church, with a house and twenty acres of land on the southern side. This house was the subject of a lawsuit in 1801. It seems that before 1703 the owners of the Beddington Estate had exchanged lands with the rector, and from time to time had granted leases to him, reserving a certain rent as well as certain other agreements. In 1753 the rector refused to pay the rent, or to deliver to the patron the straw according to the agreements of the lease, while another rector in 1801 not only refused to fulfil these obligations, but also refused to pay the tithe of oats, another of the agreements of the lease; so the patron filed a bill in Chancery against him. The decree was given in favour of the rector, but the patron recovered afterwards all his lands by gaining an action which he brought against the rector, and for some time there was no parsonage-house, the rectors being at the time unable to find another. During the present century a parsonage-house has been built adjoining the school.

There is one instance of great longevity recorded in the register of this parish. William Stuart, or Old Scott, as he was more commonly called, attained the great age of one hundred and ten years and two months. He was buried the 31st of January, 1704-5.

It appears that Beddington did not wholly escape the ravages of the Plague. Eight persons are recorded to have died of it in 1594, ten in 1603, and eleven in 1625.

WALLINGTON.

The early records of Wallington are wrapped in obscurity. Some consider it to have formerly been a place of importance from the fact of its giving its name, in the time of the Saxons, to the hundred. But

whether it was so or not is by no means clear. In Domesday Book it is entered as Waleton, and it is there stated that the king held the manor in demesne, and that it was rated at £12 in the time of Edward the Confessor, and then at £10. Two mills at thirty shillings are also mentioned in that book as being at this place.

Henry II. granted certain lands at Wallington to Maurice de Creon, to which Guy de la Val came into possession on his marriage with the daughter; but later, being one of the barons who rebelled against King John, he was deprived by that monarch of all his lands at Wallington, and these were then granted to John Fitz-Lucy, who however forfeited them by remaining in Normandy. The king then bestowed them on Eustache de Courtnay. In Henry the Eighth's reign we find that the Manor of Wallington had passed into the hands of Sir Nicholas Carew, and after that nobleman was attainted of high treason, into those of Sir Edward Dymock and Sir James Harrington. This last gentleman alienated them to Sir Francis Carew, son of the one beheaded, and in this family they remained until 1683, when a lease for the term of five hundred years was made by Sir Nicholas Carew for the purpose of raising a fortune for his younger sons. The lease was acquired in 1726 by Elizabeth Bridges, sister of William Bridges, M.P. for Liskeard. Under her will it passed through successive ownerships to various members of her family, and ultimately to William Bridges, Esq., who in 1781 became sole owner by a family arrangement. Under his will it devolved eventually upon the late John Bridges, Esq., who, dying in 1865, left it to his son, Nathaniel Bridges, Esq., the present owner. The latter has recently bought up the nominal reversionary interest vested in the representatives of the Carews, and has thus converted the leasehold estate into one in fee simple.

In the year 1867, the present Lord of the Manor built the new church at Wallington on a site which was also his gift, aided to some extent by two anonymous donors. The church was consecrated on the 28th September, 1867, in the name of the Holy Trinity; and on the 20th December following, the new district chapelry of Wallington (embracing about 521 acres) was constituted by an order in

Council, and the incumbent of which has sole and separate jurisdiction therein for all ecclesiastical purposes. Shortly afterwards Mr. Bridges built the parsonage-house, now occupied by the Rev. John Williams, M.A., the first incumbent of the district, and he also persuaded the Ecclesiastical Commissioners to grant a small permanent endowment to the living, the advowson of which is vested in himself.

The Schools at Wallington were established about thirty-five years ago, by the late Mr. John Bridges, there being then no parochial schools either for Beddington or Wallington, and they were maintained by him at his sole charge during his lifetime. His successor, the present owner, continued this arrangement until the creation of the new district chapelry, shortly after which a plan for enlarging the schoolrooms was carried out through local subscriptions, and he thereupon made them over by gift for the use of the district.

At Wallington House, lying immediately to the south of my garden, an underground room was discovered a few years since, called familiarly the Dungeon, which, from its finished workmanship, appears to have belonged to a superior building of which there is no historical account.

The old books also describe a Gothic chapel, the site of which has been considered to be on the beautiful grounds of Mr. Graham, behind the Brewery. On visiting this spot where the earth has been excavated, I learnt that this year the ground had been deeply trenched. The men found bricks, flints, and stones; and below, extensive foundations of former buildings. Tons of stone were piled together, and one piece which was left unburied was evidently a stone of a window or door of a first-class Gothic edifice. There were numerous other fragments of tooled stones, which afford confirmatory evidence that this was really the spot where the Gothic chapel was built. Manning wrote that in his time the stonework of the windows was entire, that the east window was stopped up, and that there was rich Gothic architecture on each side of it.

Coins of Edward I., Henry III., James I. of Scotland, William III., and Queen Elizabeth have been found at Beddington. Coins have also

been found at Wallington of William III., Charles II., George I., and George II. In Mr. Jackson's garden at Carshalton was also found a penny of Edward IV. (fig. 16). A token was issued from Beddington in the seventeenth century, as stated by Manning and Bray: ROBERT HILLER U — R. BEDINGTON IN SURREY HIS HALFPENNY.

FIG. 16.—Penny of Edward IV.

Beddington, and the neighbouring grounds of Wallington House, are celebrated for the magnificence of their trees. The elms, limes, and horse-chestnuts are of extraordinary size, and there is a fine old larch not far from the church, with alders in the low ground. There was, a few years ago, an old oak called "Queen Elizabeth's oak" (fig. 17), which was ruthlessly removed for the ugly new watercourse, and carried to a timber-yard at Croydon. On my north-east boundary is a bank of trees of various kinds, which in autumn, when lit up by the rays of the setting sun, are of striking beauty, especially when contrasted with the leaves of the white willow, which, glistening like silver, add to the loveliness of a summer afternoon. I received with delight, on Lady-day 1871, the intelligence that the learned Rector, the Rev. A. H. Bridges, had become the possessor of these noble trees, as I have full belief that he will continue to preserve that which only time and taste, with a genial soil, could have produced.

FIG. 17.—Queen Elizabeth's Oak,

The river running through the Park has within the last few years been diverted from its ancient course into a new channel, and the waterfall and old canal mentioned in many books have been removed. From a photograph taken by my son of the bridge and river as it formerly ran, I am enabled to give a view of the pastoral scene which was presented from my garden, with the glorious row of fine limes to the right, upon which Cicero, with his love for "*ordines arborum*" might have delighted to gaze (plate 17). At the present

Plate 6.

time workmen are employed to divert the river a second time, and a stone bridge has been constructed.

This Park was formerly a deer park, but the deer were sold in 1852, and have not been replaced.

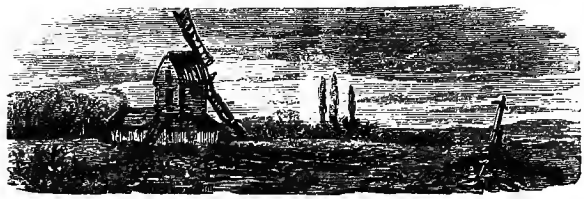
Not far from Beddington Church, opposite the Plough inn, in the grounds of Mr. Watney, there exists a cave, of which many fabulous tales are told in the neighbourhood. By the courtesy of Mr. Watney I visited it with Mr. Addy. We found that it was an excavation in the bed of sand overlying the chalk, and possibly was formerly used for the purpose of defeating the Excise laws. Certainly there was no evidence of its having been continued to Reigate, as some persons would fain have us believe.

BEDDINGTON AT THE PRESENT TIME.

Beddington Church (vign. iv.) has been restored, and is not only a pleasing object from my garden (plate 6), but the church with its churchyard is one of the most picturesque near London. It has been supplied with a melodious peal of bells, which record the sorrow and declare the joy of the inhabitants. The village is rather a residence for the rich than for the poor, though Beddington Hall is now used as the Female Orphan Asylum. The tower of the church is seen through a vista of trees from my garden, and then reflected from the transparent waters of the lake, as though Nature ordained that so good an object should be twice seen. The churchyard is overshaded by fine trees.

> "Beneath those rugged elms, that yew-tree's shade,
> Where heaves the turf in many a mouldering heap,
> Each in his narrow cell for ever laid,
> The rude forefathers of the hamlet sleep."—GRAY.

Vign. V.—Beddington Hall before the Fire.



Vign. VI.—View on Mitcham Common.

CHAPTER II.

GEOLOGY OF MY GARDEN.

WHEN I first entered upon the land of my garden, I could not walk across it; it was a kind of peaty bog. However, I lowered the central brook, made a second stream parallel with the river, and another crossing the garden at right angles. The ground in many places has been turned over, as we find occasionally brick piers. In some parts of the ground are beds of gravel of an inferior character, in other parts gravel full of water is found immediately below the surface. Below this is a layer of coarse flints, constituting a drift bed running from Croydon. Some of these flints contain fossils, as though they were washed out of the chalk (fig. 18). The whole is covered with a poor exhausted peat, which rhododendrons detest, and which not many plants like. Within the memory of many of my friends, the place was used for bleaching and printing grounds, such as now exist on a similar river between Amiens and the chalk downs on the road to Paris. On the southern part of the garden a bed of sand exists, the last bed of the Lower Tertiary series. This sand is extremely minute (fig. 19), much finer than the Lower Green-sand at Reigate (fig. 20), a bed below the chalk, of both which I have given figures. Notwithstanding the fineness of the grains, the bed as a whole can be tunnelled, as is actually the case in the cave on Mr. Watney's property.

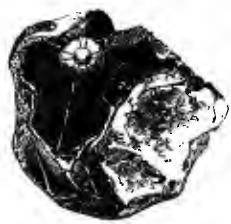
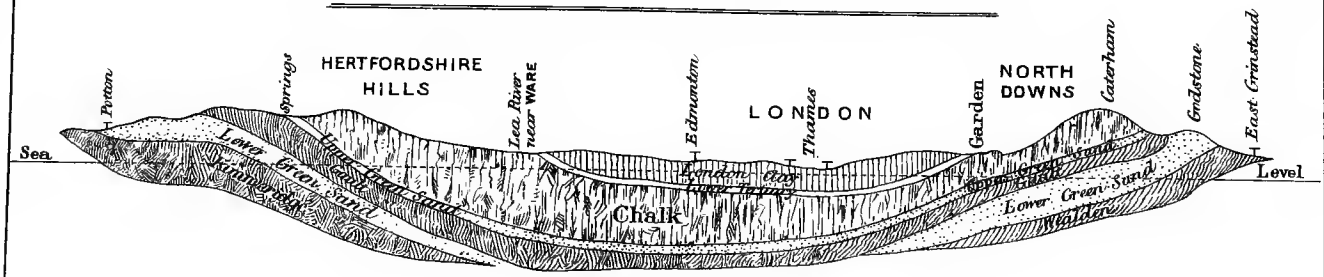


FIG. 18.—Flint cast of Cidaria.

FIG. 19.

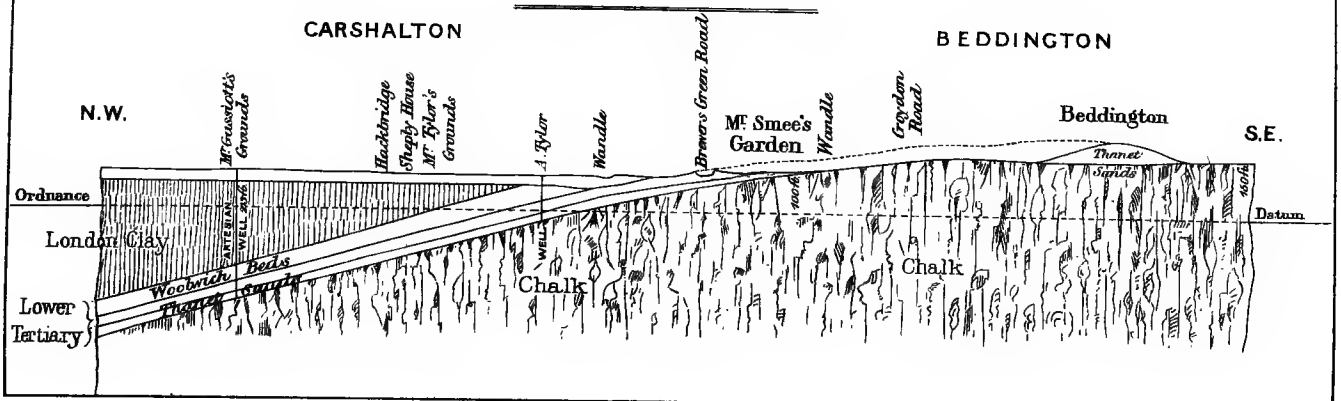
FIG. 20.—Reigate Sand, enlarged 10 diam.

SECTION OF THE LONDON BASIN, NORTH TO SOUTH.



12 Miles to an Inch

SECTION THROUGH GARDEN.



GEOLOGICAL MAP OF THE DISTRICT.

Beyond this bed of sand in the south, the chalk comes to the surface, and dips under my garden, not coming near the surface again till South Mimms and Hatfield, north of London. On the north of my garden, blue clay and the whole series of Lower Tertiary beds of clay and sand exist (plate 5).

Geologically speaking, we are at the very edge of the London Basin ; a section of which, copied from the Geological Survey by the kindness of Sir Henry James, is given in plate 4. Under London, as the centre of the basin, we have a depth of about one hundred feet of these Lower Tertiary beds, of which my bed of sand is the last: above these we have another one hundred feet of blue clay. This is covered with a bed of gravel, and finally with a layer of about sixteen feet of waste earth, and occasionally of peat. These depths vary somewhat in different localities; but, from an examination of the sections of many London wells, these measurements may be taken as generally accurate.

The dip of the strata through my garden has been kindly drawn for me by Mr. Alfred Tylor the geologist, and his section (plate 4) shows how rapidly the different strata fall towards the Culvers, the property of Mr. Gassiot, as they dip through the grounds of Shepley House, the residence of Mr. Tylor.

To the south of us the chalk comes to the surface and rises to above 850 feet. The chalk consists of two layers, the upper chalk with flints, and the lower chalk without flints. Flints occur in horizontal layers, which may be traced for miles; these are crossed by veins more or less perpendicular, like mineral veins in Cornwall. These vary from a hair's breadth to a foot in width. These cracks, like the layers of flints, run for miles, and sometimes there is a dislocation of the flints where the cracks occur, one side being higher than the other, as may be well seen at the Sutton chalk-pit. These cracks are the underground rivers or watercourses of the chalk; and whenever in sinking a well one of these cracks is tapped, a valuable flow of water is secured. When, on the contrary, only the solid chalk is pierced, a very small supply of water is obtained. The existence of these fissures is of great value to mankind.

The water issuing from these cracks is as clear as crystal, and charged with carbonic acid. It has the temperature of 52°, which is warm in winter, and delightfully cool to our senses in summer. It contains sufficient saline and calcareous matter to make it palatable, and hereafter I shall point out that these cracks give to us the inestimable blessing of the River Wandle.

There is abundant evidence to prove that chalk was formed at the bottom of an ocean. Chalk consists, chemically, of carbonate of lime. It is amorphous, and no power of the microscope reveals structure. This is very curious, because chalk deposited by Clark's process is invariably crystalline.

Chalk appears to result chiefly from the decay of the lower animals, and it is a most interesting discovery of modern times that another deposit of chalk is now being formed at the bottom of the Atlantic Ocean and Mediterranean Sea. Innumerable foraminifera live in these seas (fig. 22); these die and fall to the bottom, and it is now a

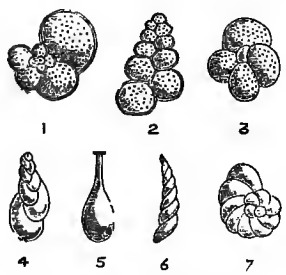


FIG. 21.—Foraminifera (ancient).

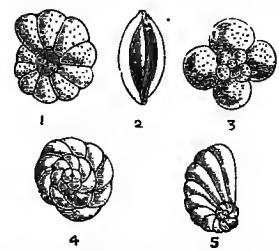


FIG. 22.—Foraminifera (recent).
1. Planorbulina Ungeriana.
2. Trilochulina tricarinata.
3. Globigerina bulloïdes.
4. Rotalia Beccarii.
5. Nonionina turgida.

universally recognized fact that by their decay a bed of chalk is being formed for future ages. Corals, however, besides foraminifera, contribute to the formation of chalk.

I asked Mr. Groves, who has great experience in microscopic objects, to examine the chalk of our district to determine the foraminifera which it contained. He discovered that little pockets in the flints yielded the greater number, and from his investigations he found many of the shells of the foraminifera to be in a fair state of preservation. He found numerous forms of the Rotaline series (1, fig. 21).

textuluria (2), polymorphina (3), lagena (4), globigerina (5); and also that nodosaria (6) was represented by many of its very beautiful varieties. There are also other forms of foraminifera much resembling miniature ammonites and nautili (7).

The revelations of the microscope showing to us how chalk was formed in times gone by, and how it is being formed by similar creatures at the present time (fig. 22), are certainly not the least interesting results of modern science.

The chalk in our district is not highly fossiliferous. The chalk-diggers tell me, the deeper they go the less they find. Many old books state that fish have been found fossilized in the chalk near Croydon. Mr. Flower kindly lent me one (fig. 23) to figure, from Riddlesdown, but they do not appear to be very common. Mr. Herbert Jackson, when the cutting was made for the Sutton Railroad, watched the proceedings and obtained several species: one was a tooth of a kind of shark (fig. 24), called the *Corax falcatus*. Some bivalve shells were found, such as the *Rhynchonella plicatilis* (fig. 25), and the *Terebratula semiglobosa* (fig. 26).

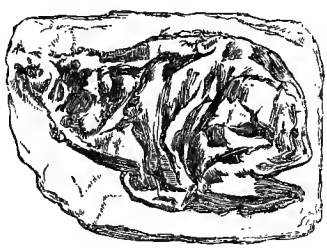


FIG. 23.—Fossil fish's head, ½ real size.

FIG. 24.—Tooth of Corax falcatus.

FIG. 25.—Rhynchonella plicatilis.

FIG. 26.—Terebratula semiglobosa.

All over the Downs curious things, known to the country people as shepherd's crowns, are found, which are different kinds of echini. Two forms of one kind are found of *Galerites albo-galerus* (fig. 27); I have also figured a flint cast of *Holaster pillula* (fig. 28), and a specimen of *Pseudo Diadema variolare* (fig. 29). All these are varieties of sea-urchins or echini, one species of which is constantly seen on our sea-coasts, demonstrating the marine origin of chalk.

Besides these traces of marine animals, the flints which we use in the garden have frequently the stems of encrinites attached to them,

Depressed form. Normal form.

FIG. 27.—Galerites albo-galerus.

FIG. 28.—Flint cast of Holaster pilula.

and the allies of cuttle-fish are to be found in the belemnitella (fig. 30). Occasionally in the chalk is found fossil wood, probably of a coniferous tree, so that there must have been land on which the tree grew when the chalk was being formed under water (fig. 31).

The beds of flint appear to have an animal origin, and the perseverance of Mr. Bowerbank proved to geologists at last that the greater part were derived from sponges. A layer of animal matter seems

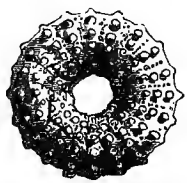


FIG. 29.—Pseudo Diadema variolare.

FIG. 30.—Belemnitella.

FIG. 31.—Coniferous wood on flint, with piece enlarged, showing structure and the coniferous discs.

to have covered the bottom of the sea, and attracted to itself silica or flint. Sometimes the flints extend for miles and miles in one almost continuous agglomerated mass, at other times the flints are more separated. One of these sponges, *Polypothecia*, from the interior of a flint, is here shown (fig. 32); also *Ventriculites radiatus* (fig. 33). Sometimes the sponge enveloped an echinus or bivalve shell, as sponges do now—*Spondylus spinosus* (fig. 34) and *Diadema* (fig. 35).

Sometimes one sponge has been found to interpenetrate another, and both have been silicified together. Mr. Charles Tyler, of Holloway, possesses a remarkable and interesting collection of silicified

sponges, and also a collection of recent sponges as they now grow, and every peculiarity which can be recognized in the present period can be traced in their ancient fossil prototypes.

FIG. 32.—Cup-shaped sponge (Polypothecia).

FIG. 33.—Sponge in chalk (Ventriculites radiatus).

FIG. 34.—Spondylus spinosus.

FIG. 35.—Cast of Diadema in flint.

The law of the deposit of silex on decomposing animal matter has been extensively examined by my son, Mr. A. Hutchison Smee. Some organic bodies appear to silicify with ease, others with difficulty. A sponge throws down silex readily. He has been able to silicify a blood-corpuscle so perfectly, that when incinerated and its animal matter destroyed, it showed its structure. Bones do not appear to throw down silex readily. His experiments require further examination before the law of silicification can be absolutely determined.

Beyond the chalk, to the south, a layer of sand comes to the surface (plate 5), and beyond this again a thin layer of clay called the Gault, which is of great importance, as this clay is impervious, and passing underneath the chalk prevents the water from flowing out of the chalk as certainly as though the whole bed of chalk were placed in a china basin. This bed of clay determines the flow of the springs, and is therefore geologically of much interest. Beyond this again is the Lower Green-sand, a coarse sand much larger in the grain than that immediately above the chalk (fig. 20). Beyond this again is the Wealden clay, a deep bed totally impervious to water, and which, at the Idiot Asylum at Earlswood, was bored for 1,000 feet without yielding any water.

On the top of the last bed of sand over the chalk is a layer of flints of somewhat different chemical character from those in the chalk, and more ferruginous. This layer comes near to the surface at Carshalton,

in the garden of Mr. Philpotts. I was kindly permitted to open the ground, and found the bed of flints which Mr. Henry Lee minutely examined, and portions of fish-scales were discovered. Mr. Lee had preserved a beautiful scale, which he had found when Mr. Sims resided at the spot: this he permitted me to figure (fig. 36), but I am grieved to say it was lost in the act. The fish is supposed to be a species of Acrognathus or Aulolepis. It is figured the natural size and magnified ten diameters.

FIG. 36.—Fish-scale in flint, probably Acrognathus or Aulolepis.

FIG. 37.—Group of fossilized shells.

Above this bed, and higher up in the Lower Tertiary beds, a layer of a dense mass of shells exists (fig. 37). It is to be seen at Lewisham, and was cut across in making the Thames Tunnel Railroad. I am informed that a layer of shells has been found in Paper Lane, Carshalton, a spot where this bed might naturally be expected to be found.

THE RIVER WANDLE.

Through my garden a beautiful and celebrated trout stream runs, called the River Wandle; its transparency has been recorded by Pope, —"the blue transparent Vandalis appears." The branch which runs through the garden rises at Waddon, where it immediately turns a flour mill; it is joined by a little stream which rises above Croydon, and comes out at a culvert to the west of Croydon Church; it then passes to Beddington, driving a snuff mill, thence it runs through Beddington Park to my garden, where it drives a paper mill; and, after passing a short distance by the estate of Mr. Graham, joins another and larger stream at Shepley House, and becomes one river, which

Plate 7.

runs uninterruptedly over the blue clay, and empties itself into the River Thames at Wandsworth.

The second branch rises by many springs almost entirely within a radius of a mile south-west; one spring, indeed, rises on our eastern boundary and traverses the garden to form the Central Brook. A second rises near the mill, and discharges itself into the backwater. One, yielding a very large supply of water, comes from the grounds of Wallington House, and makes the Crystal Waterfall. Another large spring rises in Carshalton Park, and, after traversing the grounds of Mr. Philpotts, drives a water-wheel. Near Carshalton Church a great body of water rises from the ground. One of these springs is supposed by the villagers to have been caused by Anne Boleyn's horse making a hole in the ground, from which water has flowed ever since (fig. 38, vign. ix.): another large stream rises from the ground in a pond at Carshalton House. All these latter springs discharge their water into two large ponds in front of Carshalton Church; thence they pass to a flour mill, thence to a paper mill, and then, from a second flour and snuff mill, to the grounds of Shepley House, to unite with the Croydon branch.

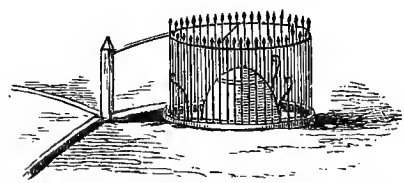


FIG. 38.—Anne Boleyn's Well.

The snuff mill, in the occupation of Mr. Ansell, is very picturesque, and I am enabled to give a graphic view of it (plate 7) from the pencil of Mrs. Jackson, of Beechwood Lodge, Carshalton.

The River Wandle depends upon springs for its water, and receives but very little from immediate rainfall. The river may be discoloured for a short time by heavy rain from road-washings, but the addition to the water is but small.

The *rationale* of this phenomenon is interesting, as the rain which falls upon the porous chalk to the south is immediately absorbed, and is only given up slowly in the springs. In the hard impermeable chalks of the south of France and Italy, the rainfall runs off in a desolating mountain torrent; and when it ceases the water is lost, and the bed

of the river is left almost dry. Here with our porous chalk the water is retained, and is given off during the whole year.

Upon reference to the section of the strata of the London Basin (plate 4), it will be observed that a layer of impervious clay exists below the chalk, which comes to the surface to the south of the chalk hills on the north of Redhill and Reigate. In consequence of this clay, the water is not discharged into the valley of the Darenth, but is compelled to drain away to the north of the chalk. But then, between my garden and North Mimms in Hertfordshire, it is again covered with a layer of sands and clays for 100 feet, and over these again by an impermeable layer of blue clay through which no water can rise. The water, therefore, is by compulsion restricted to flow at the edge of these two sets of clay beds. Hence it rises about my garden to form the River Wandle, and on the other side the London Basin it also rises, at Watford to form the River Colne, and elsewhere to form the River Lea. Between these two sets of springs, north and south of the London Basin, water can be obtained by sinking wells through the impermeable strata to the chalk.

Wallington Bridge is 93½ feet above mean tide level of the Thames; and as there are two or three mills above the garden with a fall of four feet, it follows that the springs of the Wandle are more than 100 feet above the level of the Thames. A reference to the contour map, kindly prepared for me under the direction of Sir Henry James at the Ordnance Survey Office, Southampton, will show their height and the relative position of the surrounding country.

Water flowing from the chalk strata invariably contains chalk or carbonate of lime in solution. Chalk by itself is extremely insoluble, and one part is only soluble in 10,000 parts of water. It is, however, very soluble in carbonic acid, and the water from the springs has always carbonic acid by which the chalk is dissolved.

To remove the chalk from the water, Dr. Clark has invented an ingenious process, thus getting rid of the excess of carbonic acid. This he effects by adding a small quantity of lime-water sufficient to combine with the excess of carbonic acid, and to form the two into

chalk, which, being insoluble, falls as minute crystals to the bottom; and the chalk dissolved falling also with this newly-formed chalk, the water is freed from this material. This process is followed upon a large scale at Caterham and other waterworks, whereby hard water is converted into soft: this is thought by some people to be of great advantage in a town supply, but I cannot myself fully acknowledge the value of this chemical process, preferring for many purposes the water as it flows naturally from the earth.

In all chalk waters some saltpetre or other nitrates are invariably found. Some chemists consider this compound as a proof of previous sewage contamination, others consider that the nitrates arise from nitrogen derived from the atmosphere, but all medical men agree that the nitrates are unimportant in a sanitary point of view.[1]

Three great chemists, Professor Hoffman, Professor Miller, and Professor Graham, recommended that London should seek its water-supply from the chalk. I also have laboured in the same direction, and am chairman of the South Essex Water-works, promoted for that object;—but great and trustworthy men, as Professor Frankland and Mr. Bateman, have continually opposed this view. However, during the past year a change has come over the opinions of many of its opponents. Dr. Frankland points out that the best water now supplied to London comes directly from the chalk, and Professor Tyndall has demonstratively proved, by the electric lamp, that chalk water contains no solid particles. He has shown that solid particles reflect light, and become visible, when a ray of light passes through the water, and that all other water contains an immeasurably greater number of particles than chalk water flowing from the bowels of the earth.

Professor Odling has kindly made me a careful analysis of the water of the River Wandle: first, as it flowed through my garden; secondly, as it flowed through the Central Brook, which is within 200 yards of its source; and thirdly, at the Crystal Waterfall, near the spring at Wallington House, of which the following is the result. He also

[1] My son has recently found that the air contains as much nitrogen in combination as is found in nitrates in chalk water.

added the analysis of the water obtained from the old and new wells at Croydon.

	River.	Central Brook.	Crystal Well.	Croydon Old Well.	Croydon New Well.
	Grains per gallon.				
Total residue	20·30	20·51	22·75	22·14	21·98
Lime total	8·54	8·19	9·44	9·64	9·67
= Carbonate of lime . .	15·34	14·64	16·87	17·21	17·26
Actual carbonate	12·41	12·83	13·00		
Magnesia.	Traces.	Traces.	Traces.	0·16	0·15
Chlorine	1·24	1·36	1·30	1·22	1·21
= Common salt	2·04	2·24	2·14	2·03	2·00
Sulphuric acid	0·78	0·90	0·98	0·64	0·68
Nitrogen as nitric acid . . .	0·217	0·215	0·227	0·021	0·018
„ ammonia . . .	0·003	0·000	0·002	0·002	0·003
„ organic matter .	0·007	0·007	0·008	0·004	0·004
Degrees of hardness. . . .	16°·4	16°·5	17°·0	16°·4	16°·8
„ permanent hardness	3°·7	3°·5	4°·5	3°·0	3°·5

The water from the Wandle flows from the chalk, but when the Board of Health was organized at Croydon it required large quantities of water which would otherwise have passed to the river. The abstraction of this water was a matter of complaint by the millowners; and a litigation ensued which ended in a judgment of the House of Lords in the celebrated case of Chasemore *v.* Richards. The case was so important, that I asked Mr. Risdon Bennett, the barrister, to epitomize it for me, and he prepared the following statement:—

"By the case of Chasemore *v.* Richards, reported in 7 H. of L. C. 349, in which the judgment of the Exchequer Chamber was affirmed, the question of the right to subterranean waters was finally settled. The facts were as follow. The plaintiff was the occupier of an ancient mill on the River Wandle, and for more than sixty years before the commencement of the action he and all the preceding occupiers of the mill used and enjoyed, as of right, the flow of the river for the purpose of working their mill. It also appeared that the River Wandle

was and always had been supplied above the plaintiff's mill, in part by the water produced by the rainfall on a district many thousand acres in extent, comprising the town of Croydon and its vicinity.

"The water of the rainfall sinks into the ground to various depths, and then flows and percolates through the strata to the River Wandle, part rising to the surface and part finding its way underground in courses which continually vary. The defendant, who represented the Local Board of Health of Croydon for the purposes of supplying the town of Croydon with water and for other sanitary purposes, sank a well in their own land in the town of Croydon and about a quarter of a mile from the River Wandle, and pumped up large quantities of water from their well for the supply of the town of Croydon, and thereby diverted and abstracted underground water, but underground water only, that otherwise would have flowed and found its way into the River Wandle, and so to the plaintiff's mill, and thereby sensibly hindered the working of the plaintiff's mill.

"The question was, could the plaintiff maintain an action for such diversion and abstraction? The House of Lords, after consulting the judges, decided not, and held that no right could be acquired to subterranean water flowing or percolating in indefinite channels, and that the rules of law applicable to surface waters do not apply to subterranean streams. This case has been regarded as the leading authority on questions of subterranean waters, and has been followed ever since. The reasons for the decision of the House of Lords are well and ably discussed in Mr. Gale's work on Easements (Eighth Edition)."

The practical effect of this judgment is to allow any person well versed in the geological features of a country to rob a river entirely of its supply of spring water, and there does not appear to me that there would be any difficulty in depriving the Wandle of its water, and making it flow down the valley of the Darenth, as this would be a mere question of money and engineering skill.

The Wandle has also been the subject of other important litigation, for the Board of Health of Croydon carried all the sewage of the town into the river which passed through Beddington Park to my garden.

The effluvium was noxious; the fish died; and foul mud was deposited at the bottom of the river. It became a question whether I should abandon my garden; but I determined otherwise, and commenced an agitation to stop the pollution of rivers. Communications were made to the Privy Council; a series of bills in Chancery were filed—nearly simultaneously by three separate landowners; and injunctions were obtained restraining the Board of Health from polluting the stream. The Croydon Board resisted the law till a committal was signed to commit the members of the Board to prison. The ratepayers were involved in great cost; but in the end the law proved too strong—even for a board of health,—and so I was permitted to enjoy my garden in peace.

When the law turned the sewage fairly out of the river, it was placed upon the land; but then the irrigation scheme was so badly carried out that a pestilential marsh was created, much admired by snipes, but so little adapted for human beings that fever, especially scarlet fever, raged throughout the district.

Lately the Croydon Board have carried on their works more satisfactorily, by using a far greater quantity of land in relation to the quantity of water; for the real difficulty of dealing with sewage is the great quantity of water which it contains.

At the present time the sewage is filtered by a cleverly contrived apparatus (fig. 39), designed by the engineer to the Board of Works, Mr. Latham, which separates all the coarse solid particles, such as bottles, stones, bricks, pieces of earthenware, and leaves aqueous matter alone to be distributed over the land. Mr. Latham's filter is self-acting, and is perfect in its operation. The figure shows the great revolving filter through which the water passes, and also the clever arrangement by which all the solid matters are carried away by a revolving screw. The motive power of the whole

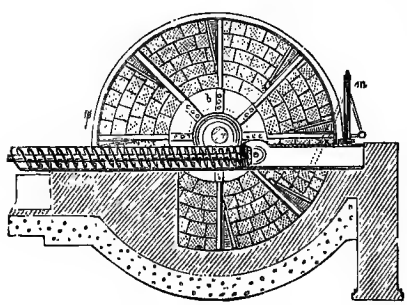


FIG. 39.

is a turbine-wheel worked by the sewage itself. This is an hydraulic apparatus not much employed in this country, though the celebrated paper-mill at which the paper for the Bank of England notes is made has been worked for years by a turbine.

It is probable that ultimately Croydon will be compelled to distribute the sewage over higher grounds, where the subsoil is more porous, as the effluvium is now sometimes offensive.

The effect of land in absorbing the bad parts of sewage is very remarkable. Professor Odling investigated the action on the Beddington sewage grounds in November 1867. The sewage, amounting to 3,274,300 gallons, had been distributed over 30 acres of land for two days. Professor Odling analysed samples of the affluent water taken every quarter of an hour, of which the following is a summary:—

Analysis of Sewage of Croydon, Nov. 24, 1867.

	After Purification by Irrigation.	After Subsidence, before passing on to the Land.
	Grains per gallon.	
Total solid residue	26·180	25·830
Mineral matter	25·025	24·500
Volatile matter	1·155	1·330
Chloride of sodium	3·400	3·265
Ammonia	0·042	0·896
Nitrogen as ammonia	0·032	0·737
Oxides	0·419	0·000
Organic matter	0·144	0·415

The River Wandle is not immediately affected even by heavy rainfalls; nevertheless, it has occasional risings. In the year 1866 one of my family returned from Wallington, saying that I should be much astonished when I visited the garden, as indeed I was. Instead of the usual peaceful flow of water in the river, the rush was largely increased; the retaining walls of the backwater were undermined, and the earth was rapidly being washed away: so what was the matter? "The Bourne was down."

The retaining walls were protected by fixing common hurdles before them to break the power of the water. The gardener had another difficulty to contend with; for the greenhouse fires had been put out by the water rising in the ground and flowing into the fireplace. I directed a man to visit the mill below us to tell them the predicament we were in, and ask if they would kindly draw their sluice-gates. The messenger, however, quickly returned, stating that the sluice-gates were drawn to their utmost by night and by day. It was manifest that something special had to be done to meet the emergency, or all my plants would be lost. I immediately ordered the pavement to be picked up, and a hole to be sunk near the fireplace three or four feet below the level of the fire, and I ordered this to be pumped dry several times a day. It was pointed out to the gardener that the Bourne would not long be down, and that a little patience and trouble would save our plants. The scheme was fully carried out: the plants were preserved; the hole was filled up; and we have had no repetition of the event up to this date.

Whenever water rises in a stratum in which fireplaces are fixed—and it once occurred at the great Palm-house at Kew—we have only to repeat this plan. It is a mere question of pumping power, to pump away the water more quickly than it flows; a plan which is often practised by our great engineers on a large scale.

After protecting ourselves against the ravages of the Bourne, I proceeded with Professor Attfield and Mr. Edward Easton to investigate the cause of the disaster. The Bourne rises amongst the Surrey hills now and then, runs for a time, and again disappears for years. It ran in the year 1854, and did not run again till the year 1866. It rises at the top of the Caterham valley, and runs along its whole length through corn-fields, where the very bed of the stream is for years ploughed up and planted with corn. It then runs through a channel which is made for it, and passes through Croydon, and used to empty itself by a culvert close to Croydon Old Church. I have a suspicion that it has been diverted from that culvert to the general sewage system; but if this be so, it is an

engineering mistake to embarrass the irrigation system with this great volume of water, which ought naturally to flow to the river.

We made a survey of the course of the river. In the Brighton high-road, houses which would usually have been selected from their dry situation by rheumatic genflemen, had one or two feet of clear bright water in their parlours, and their gardens were converted into ponds. Proceeding up the Caterham valley, it was entirely changed in character, being converted into a series of lakes. As an unintentional caricature, notice boards appeared in the water itself, announcing that "this eligible land" was to be let for building, and scaffold boards of commencing houses appeared. This water was existing as large ponds in situations where at this moment no water can be found within a hundred or more feet of the surface. Following the course of the Bourne, we at length came to a field where the water oozed out of the grass, and this was literally the top of the river.

From our investigations it appeared to us that the Bourne arose from a supersaturation of the chalk strata to a level much higher than ordinary. The porous chalk acted as a sponge, and gave out its water when over-saturated. It is a well-known fact that the Bourne always rises when the rainfall exceeds a certain quantity in a given time. Other theories have been started, such as underground caverns or syphons; but they are mere fanciful creations, and are not required for the explanation of the phenomenon.

Near Brighton, at Patcham, a similar river to the Bourne occasionally rises, which runs down the London road by Preston, and empties itself into the sea near the Chain Pier. This river assumed in the autumn of 1852 very considerable dimensions. I am informed that another similar intermittent river runs down the Lewes road; but this I have not myself seen.

When the Bourne rises, it is usually followed by pestilence at Croydon. In 1852 a serious epidemic of fever occurred, possibly from an interference with the ordinary water-level, and disturbance of the level of the cesspools which abounded before the Board of Health commenced their works.

The drift bed, extending from Croydon to my garden, shows that at a former period of the earth's history a great volume of water passed down the Wandle; and Mr. Tylor supposes there was a pluvial period when not less than 300 inches of rain fell per annum, which washed the flints from the chalk and carried them down the ancient river to form this bed, which is a mile wide at Beddington Park.

The Wandle, taken as a whole, is the perfection of a river; its water is as bright as crystal, and is purity itself. It does not overflow with rain, nor is it deficient in dry weather. It does not freeze in winter, nor does it become very hot in summer. It has existed through all historic times; and as long as the chalk retains its porosity, and is protected by a bed of clay underneath and a bed of blue clay on that portion of its upper surface which is most depressed, and as long as rain falls upon the more elevated portion, so long will the water continue to ooze from the earth by day and by night, by summer and by winter, and to run its course as the River Wandle, and it may thus exclaim in the words of the poet—

"Men may come and men may go; but I go on for ever."

TENNYSON.

Vign. VII.—Interior of Beddington Hall.

Vign. VIII.—King's Head Inn, Mitcham.

CHAPTER III.

GENERAL PLAN OF MY GARDEN.

"Hoc erat in votis; modus agri non ita magnus,
Hortus ubi, e tecto vicinus jugis aquæ fons,
Et paulum silvæ super his foret."—HORACE, *Satira* vi.

IT is a common notion that gardens should be laid out for one general effect; but the result of such a plan is to produce a single view, and the whole can be seen at a glance. This is, however, monotonous, and my liking is to have many pictures; so that my visitors have to walk a long way before they can see the many beautiful views which my garden affords; and little spots of cultivated wildness, or of special cultivation, are found where they are least expected.

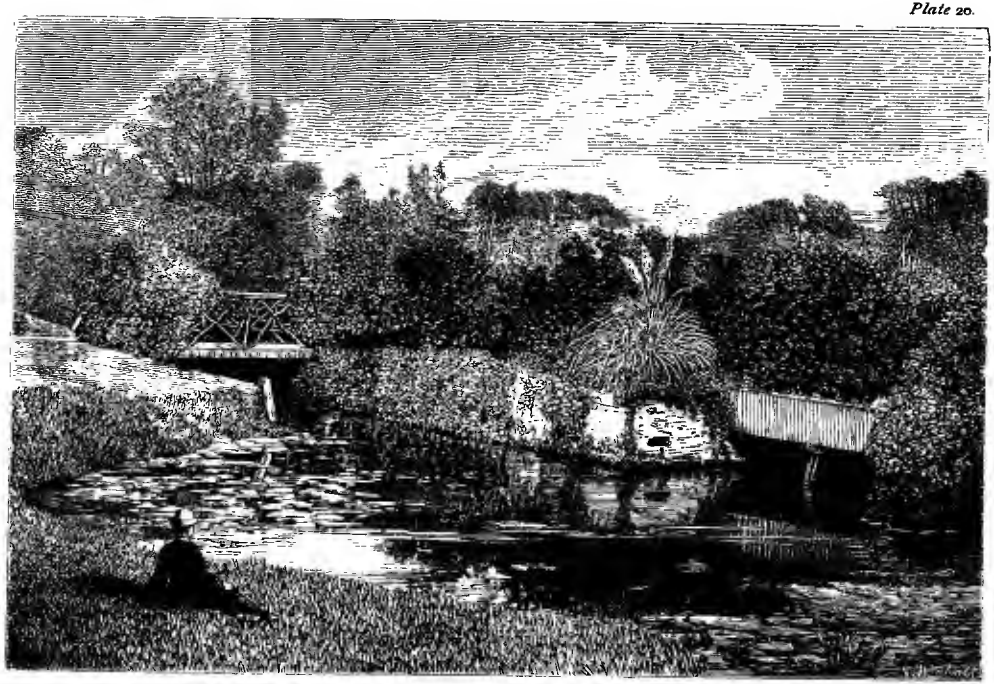
In all my designs, I have tried to suggest to the mind that it must be so; and even when my arrangements are most artificial,—as when a walk doubles upon itself,—it looks that the arrangement has been made because no other plan was really practicable; and when this idea is carried out, the garden looks natural.

Throughout my garden my vegetables, flowers, and fruit-trees are blended together in one harmonious whole: a plot of carrots and a row of flowering peas are beautiful objects in themselves, and hence plots of vegetals and fruit-trees alternate with rosaries, ferneries alpineries, and flower-beds.

Flower-beds in front of buildings are arranged as parallelograms and then the whole looks harmonious. My Croquet-ground is a parallelogram, because, as the hoops of the game are placed geo-

Plate 18.

Plate 20.



gate near Wallington Bridge, we pass parallel to the vinery by a straight walk, which leads to the backwater, where the features of my garden begin. On the right is a rustic view towards Wallington Bridge, on the left is the fern glade, with its stream, banks of ferns, and beautiful sward, whilst a bridge enables us to pass over to the backwater (plates 18 and 20) and gain the border of the lake.

At the top of the fern glade, we suddenly come upon the Fern Glen, a spot full of artificial contrivances, formed in a useless corner, where the gardeners delighted to put rubbish, and where stinging-nettles grew luxuriantly six feet high. It is so hidden that many walk round the garden without finding it.

The fern glen (fig. 40) is traversed by a larger brook, into which flow one little brook which runs through the fernery, and another which enters it from an opposite direction; it is crossed by stepping-

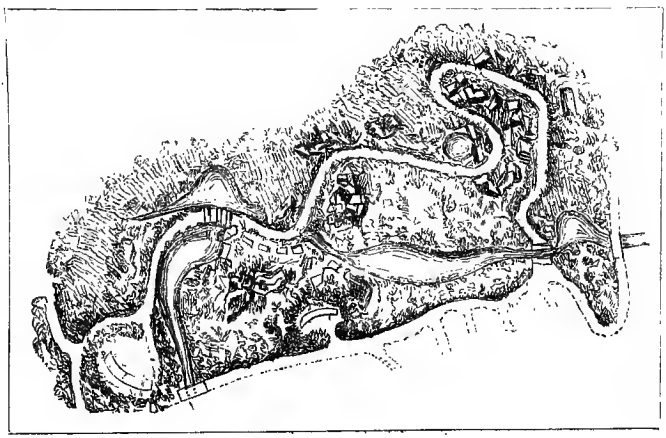


FIG. 40.—Fern Glen.

stones; and a path in ever-varying curves, and at an ever-varying level, passes through the glen, emerging over the little brook by other stepping-stones, in a rosary by the side of the lake.

Under a large willow is arranged a bower for shade from the mid-day sun, where nightingales, sedge-warblers, and wrens delight to dwell, and the babbling brook runs every hour of the day, and all the year round, making music of its own to soothe the nervous system

after the excitement of an overgrown city. The lower branches of the willow-tree are turned down, and over them are trained roses, honeysuckle, and clematis, to cover the bower.

> "Quite overcanopied with lush woodbine,
> With sweet musk-roses and with eglantine."—SHAKSPEARE.

It is not possible for the writer to describe the fern glen by words, nor is it possible for the artist to delineate it with his pencil. It has been designed to embarrass the eye and bewilder the mind; and so well has it fulfilled this end, that visitors have observed that it was a spot to be pictured by a fanciful imagination in their dreams, but not actually to exist in the reality of nature. It forms many pictures in various directions from the same spot, and Mr. Robertson has made one representation looking towards the bower (plate 8), and a second from the stepping-stones, at the end of the glen, looking backwards through a shady vista to its centre (plate 9), which is so contrived that it is lit up by the sun:

> "Sunshine in a shady place."—SPENSER.

The brook falls into the backwater below the overfall, and trout delight to visit it, and when disturbed to rush back to a place of shelter under the overfall. They may be watched for hours selecting their food as it passes by. The stones of the brooks are covered with insects, diatomes, and freshwater limpets. It truly may be said that:

> "He makes sweet music with the enamell'd stones,
> Giving a gentle kiss to every sedge
> He overtaketh in his pilgrimage,
> And so by many winding nooks he strays
> With willing sport to the wild ocean."—SHAKSPEARE.

The land, as well as the water of my fern glen, is well furnished. As we enter it we see gigantic osmundas rearing their stiff and majestic forms; enormous lady ferns gracefully showing their flowering feathery forms, with the noble broad ferns expanding their curved fronds to view. Every stump glistens with the golden-spored common polypody, and near every stone the triangular oak fern shows its fronds.

Plate 8.

Plate 9

Turning round, another view discloses alpine polypody, marsh fern, beech fern, and oak fern. Cystopteris grows luxuriantly. The beautiful *A. Trichomanes* and *Adiantum nigrum* are healthy, but to the observing eye only do the Woodsias, the filmy ferns, and the Killarney fern appear.

In one part I have attempted a mossery, and literally:

> "Here are cool mosses deep,
> And through the moss the ivies creep,
> And in the stream the long-leaved flowers weep,
> And from the craggy ledge the poppy hangs in sleep."—TENNYSON.

The grass of Parnassus abundantly lends its aid to decorate so lovely a spot, mosses of many kinds appear, and the Northern cloudberry and *Rubus arcticus* grace the scene with their presence. American adiantums flourish, and a small pond shows the frog-bit, the water soldier, and other aquatic plants. On emerging from the glen we have to traverse little tiny mountains, such as children might make as toys, but then they are lit up with the Alpine snapdragon, the lovely gentian, primulas, and other Alpine plants, with sempervivums at the apices of the stones, and many terrestrial orchids at their base. Here the "lily of the field" expands its beautiful flowers in autumn with such effect that "Solomon in all his glory was not arrayed like one of these." A cranberry plantation is arranged on the slopes towards the stream, so that the mind is led from this weak horticultural sham to the real glorious natural scenery of Zermatt and the high Alps, where such plants delight to grow.

We pass from the glen, and wonder how in so small a space and short a time our minds could have been so bewildered by so many objects beautiful and curious to the eye, and by so many sounds pleasing to the ear. We then pass through a rosary to the borders of the lake. Around this a walk is made, broken however at intervals by trees to prevent a monotonous effect. This walk, running by the border of the lake, presents a continual but ever-varied curve, and leads on the east to the orchard-house. Along this walk, six feet apart, splendid specimens of rose bushes are planted two feet from

the path. In front of these there is a flower border full of pinks, picotees, snapdragons, pentstemons, and behind the roses vegetables and strawberries are grown.

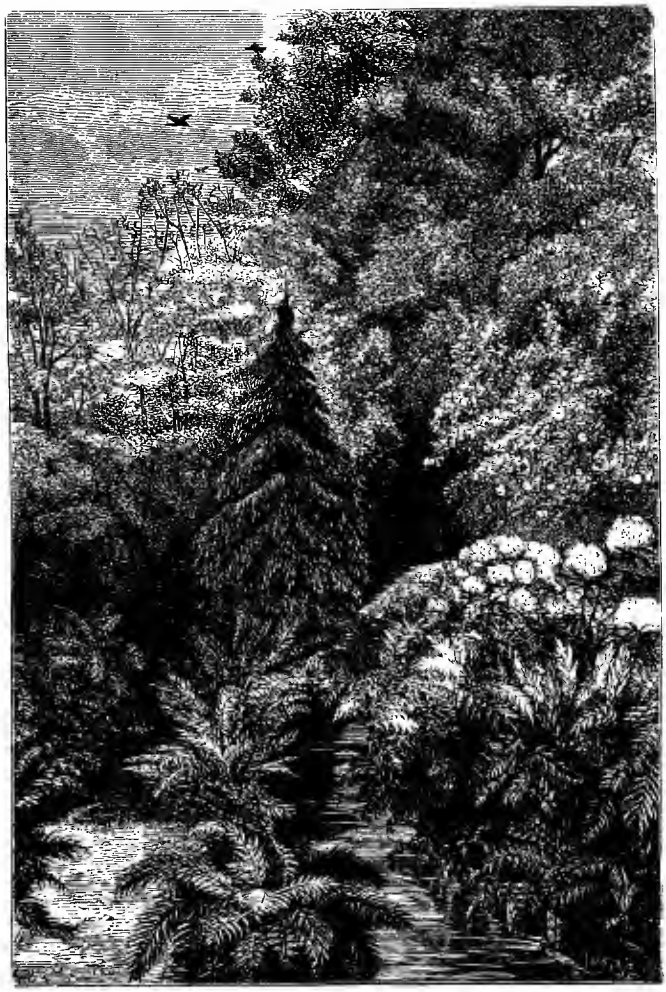
By a little skilful planting and a turn in the walk, we come suddenly upon the orchard-house and Poor Man's house, and also upon the willow bower by the water, whereby a totally different scene is presented to the eye (plate 22). Here we are perplexed by many paths: one leads to the orchard-house, another path to the Poor Man's house, a third to the pear-tree walk, the fourth or apple-tree walk passes to the croquet-ground, and the original walk itself is continued by the lake to the apparent boundary of the ground. Our eyes are again deceived, for, by a short turn, we find ourselves in a little picturesque garden with a pretty summer-house covered in front with roses, with a bower on a mound, and the entrance into the indoor fernery, which is reached by a sunken walk. The view into Beddington Park, from the door of the fernery (vign. xxi.), is very charming, especially in winter, when the snow-covered trees and grass form a striking contrast with the perpetual spring of the fernery, which is figured in the winter scene at the end of the book. I have seen visitors quite startled when they have come unexpectedly upon this garden.

From the summer-house garden we walk down the pear-tree walk, and glance at my two hundred kinds of pears on one side. Peeping over the palings into Beddington Park, which offers pretty wood-like scenery with herds of cattle feeding on the herbage, we arrive at the Valley of Ferns (plate 10). Really this valley so differs from any other scene in the garden that its effect is striking. It is like a visit to a new country. Through its centre runs a pellucid, sparkling, and bright stream, never freezing in winter and deliciously cool in summer:

> "That for itself a cooling covert makes
> 'Gainst the hot season."—KEATS.

On each side of its banks our English and North American ferns grow, encircled but not overshadowed by trees, as fine as they do in their natural habitats. At the extreme end of the valley of ferns is

Plate 10.



a bower which commands the pear-tree walk (plate 1), the valley of ferns with its brook, and a most charming view of Beddington Park.

> "Here can I sit alone, unseen of any,
> And, to the nightingale's complaining notes,
> Tune my distresses, and record my woes."—SHAKSPEARE.

Adjoining the valley of ferns we have a miniature forest of ferns, where large tree ferns are planted out in summer with good effect; and thence crossing the brook by a stepping-stone, we arrive at our outdoor exotic fernery. This is protected by stumps of trees, and is so planted around that the force of cold winds is broken. Here species of adiantums flourish, and stand severe winters. Here the grand *Lomaria chilensis* shows its noble stiff foliage, so unlike that of other ferns. Here the *Woodwardia orientalis* and *W. radicans* live but do not thrive. Here the *Cystopteris bulbifera* grows like a weed, and seems to emulate the Prussians by taking to itself the ground

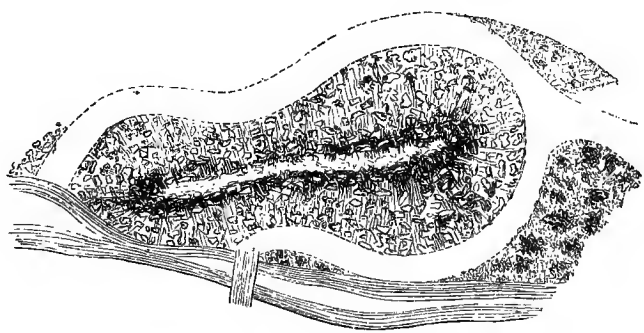


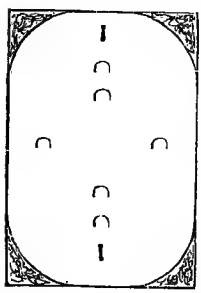
FIG. 41.—Alpinery.

which should belong to its neighbour. The water ferns come next, then the wall ferns, where *Asplenium germanicum* and *Ceterach* grow as though they were at home; and then we examine the cave where polypody covers the top, and scolopendium and other shade-loving ferns live in the interior.

The Saxifrage garden next comes to view, disclosing on the opposite bank the Sempervivum garden and Sedum garden, when we arrive at the Alpinery (fig. 41). This is a mound raised at one part, sunk at a second, and sloping to the water's edge at a third, so as to

give each plant the position it loves. There are probably not less than three or four hundred species of plants. There is scarce a season in which some are not in flower, and mostly this mound is laden with flowers of the choicest and loveliest description. Here the flowers of the Alps luxuriate by the side of the flowers of the Pyrenees; here the lovely anemones of Rome grow side by side with the wild crocus of Switzerland; and here many a little gem which is heedlessly passed by rustics as an inglorious weed, is cultivated, and becomes a reminiscence of bygone visits to other places.

After examining the alpinery we look at the water-cress bed, where this universally appreciated esculent grows in great perfection in pure water; we look at our terrestrial orchids and violet garden, and come



upon the Croquet-ground (plate 11). Our croquet-ground has been selected for the partial shade which noble elms afford from the sun in the afternoon, a time at which the game is usually played. The croquet-ground itself is an oblong with rounded corners. The scene from it, when either the roses or the phloxes are in blossom, is most delightful; and near it we have a rustic building (plate 12) covered with thatch, used for refreshment when my friends favour the garden by their presence.

By the side of the alpinery we have a picturesque bridge with a specimen of *Arundo donax*, and fine examples of the English reed (plate 13), and in the background abundance of foxgloves.

> "Foxglove and nightshade side by side—
> Emblems of punishment and pride."—SCOTT.

We return by the apple-tree walk to examine our system of cold frames, where much of the horticultural work is performed; we return by the border of the lake, which commands a view of the paper-mill (plate 14) in the occupation of Mr. Manico; we then observe the fish ladder and the eel trap, and cross the bottom of the lake by a bridge to the mill tail (plate 15), where a totally different scene presents itself to the eye. The water of the river coming from the

Plate XI.

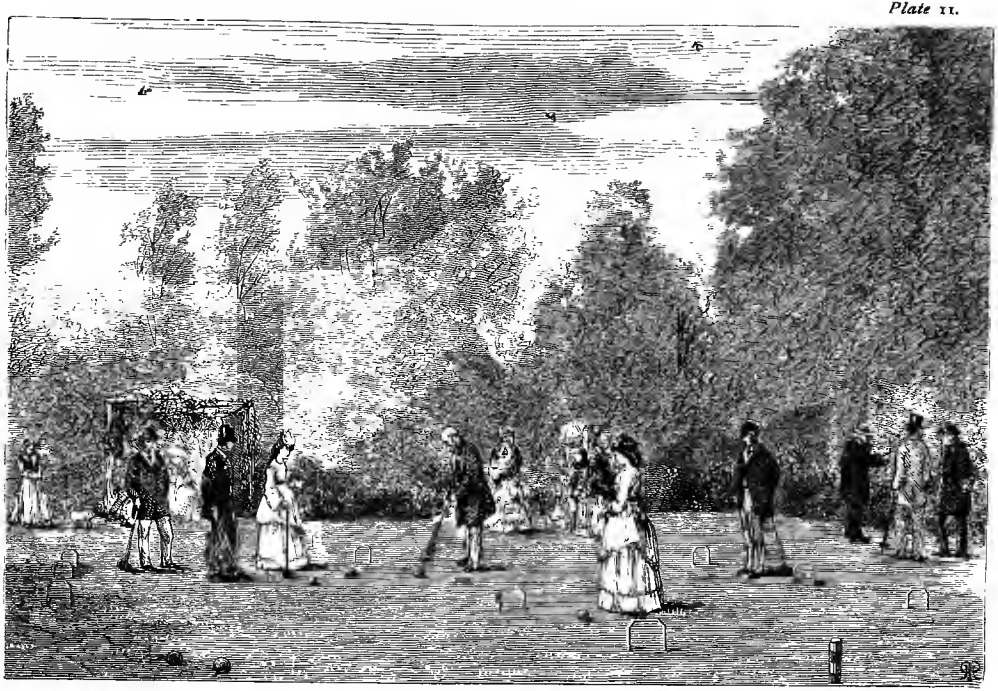


Plate 12.

Plate 13.

Plate 14.

Plate 15.

Plate 16.

Plate 17.

mill partakes of the character of a rapid, and here the water rising in the grounds of Wallington House flows into the river by the Crystal Waterfall (fig. 42). The water falls over an edge of moss-grown slate, looking more like a sheet of glass than of water. This peculiar effect is due to the presence of chalk dissolved in carbonic acid, and to the total absence of any solid particles, as is usual in chalk waters coming from the depths of the earth. After travelling on

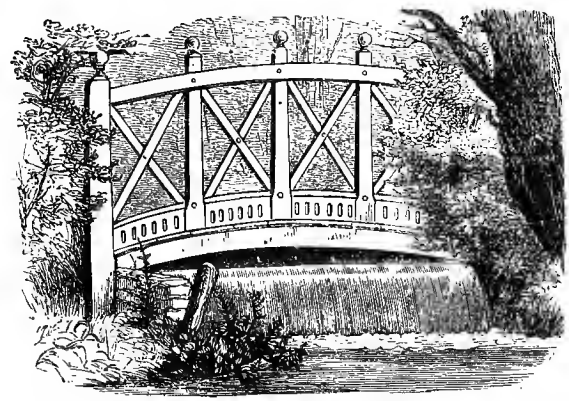


FIG. 42.—The Crystal Waterfall.

the Continent I return to this little crystal waterfall as unrivalled for its particular qualities. It is unfortunately at the boundary of my garden, or I should embellish it with surroundings worthy of its special loveliness.

Returning, we have fine views of the noble trees in the grounds of Wallington House, which are as large as any in Europe. We have a pleasant view of the garden from the south bank (plate 16), and at the top of the lake a charming scene in the Park (plate 17) is presented to the eye, which, however, the ravages of the desolating builder have of late years much impaired by altering the course of the river.

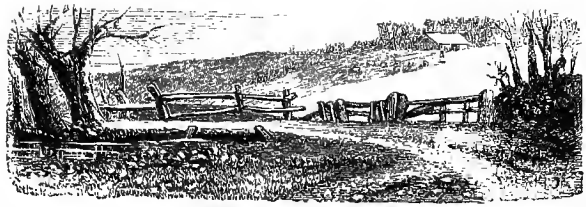
When I desire to make a design, I obtain the dimensions of the ground over which my operations are to extend. A piece of actuarial paper is then taken, which has faint blue cross lines ruled one-tenth of an inch apart. Upon this paper my sketch is made over and over

again till I am satisfied, when the design is carried out by the gardener under my directions.

My garden presents a great variety of scenery compared with its limited extent: two spots separated by a few feet present views which differ widely. The true principle in the construction of a garden is to obtain the utmost possible effect, by taking advantage of the leading features of the landscape and the most striking natural objects. To produce changing pictures much thought must be bestowed, but everyone having an eye for the beautiful may utilize these points, and design in his mind scenes which he can carry out with his hand, and ever afterwards enjoy the contemplation of them.

"But, ere we stir the yet unbroken ground,
The various course of seasons must be found;
The weather, and the setting of the winds,
The culture suiting to the several kinds
Of seeds and plants, and what will thrive and rise,
And what the genius of the soil denies."—DRYDEN'S *Georgics*.

Vign. IX.—Carshalton Church.



Vign. X.—View near Croydon.

CHAPTER IV.

PRINCIPLES OF GARDENING.

"Quare agite o, proprios generatim discite cultus,
Agricolæ, fructusque feros mollite colendo ;
Neu segnes jaceant terræ."—VIRGIL.

THERE are certain physiological principles which must be kept in mind by every gardener who desires to practise his art with success. The plants which he cultivates are built up of cells, and each plant is developed from a pre-existing cell or series of cells ; and hence it is not within the range of human power to make a plant from any primary elements, and even did we know perfectly the elementary substances of which a plant is composed, no person could put them together to make a plant.

Some persons do indeed believe that, under favourable circumstances, a plant may be formed of inorganic matter, but their belief is founded upon unexplained phenomena connected with the lower class of plants, and their speculations rather partake of fancy than of fact.

Throughout the whole range of cultivated plants there is a unity of design, a unity of obedience to certain fixed laws, which has led some minds to think that there is but one plant, which time and circumstances have modified into many varieties now separated as species.

Gardeners know as a fact that every plant is subject to variation within certain limits ; hence the origin of florist's flowers. There are more than a thousand varieties of camellias, a thousand varieties of

pears and perhaps more of apples, and there are innumerable varieties of all the kinds of plants which the gardener cultivates in his flower-garden. Nevertheless, we cannot change one plant into another though in practice it is sometimes extremely difficult to tell whether a plant is a variety or a species. Good botanists differ widely on this point in particular instances, some having a tendency to multiply species, others to restrict them. Every seedling plant has an individuality of its own, as every human being presents some points of difference, and the gardener selects those which best suit his particular purpose. If one plant cannot be changed, and never has been changed, into another, then it follows that each species has at some time in the world's history been specifically created. I myself believe, and most naturalists believe, that each species has been specifically created; but it is as easy to conceive that one organic structure should have been in the beginning created, which had the power under certain changed external circumstances of being developed into the tens of thousands of plants which live over the whole surface of the globe.

Every plant is composed of carbon, hydrogen, and oxygen in combination, water as water, and certain mineral matters which are interspersed throughout the entire structure of the plant. The carbon is obtained from the carbonic acid which exists invariably in the atmosphere; the compounds of nitrogen are derived from aqueous solutions of ammonia or nitrates; and the earthy salts are also absorbed from solutions of matters contained in the ground.

The plant, to assimilate these matters to itself, must be acted upon by the physical forces of heat and light, in an atmosphere having a proper quantity of water. No gardener can succeed without attending to all these points, as every species requires its own particular treatment.

All plants reduce their carbon compounds, as the woody fibre, starch, gum, and sugar, by means of their leaves, from the air, and derive the nitrogenized principles, as their albumen, together with the water and earthy salts, by means of their roots, from the ground. The leaves, to perform properly their functions, require moisture in the

atmosphere ; and the roots must be in contact with soil in a particular physical condition. Some plants, as orchids and ferns, must be kept in a moist atmosphere ; others, as cacti, like a drier condition. Some plants, as vines, like a moist atmosphere whilst they are growing, and a drier atmosphere whilst they are fruiting ; and in my garden there are many contrivances for supplying water to the air of the glass-houses.

The amount of woody fibre, which may be reduced by leaves from the carbonic acid of the atmosphere, has been determined by Messrs. Lawes and Gilbert to be about 4,000 lbs. in weight in a single year; and Professor Odling has computed the air over one acre of land to contain 20,000 lbs. of carbon in a state of combination as carbonic acid, which is present to the extent of about $2\frac{1}{2}$ per cent.

The roots of a plant must have their own proper position. The orchids or air-plants have their roots in the air, or merely covered with moss. Some plants like peaty soil ; others, as peach-trees, require the closest loam. Fruit-trees in pots will not succeed unless the soil is rammed with a mallet to make it close. The *Rumex aquaticus* flourishes with its roots under water, whereas most trees, and numerous plants, would perish if their roots were under such conditions. The surface of a pot is favourable for the roots of many plants ; as they derive air, moisture,—and probably earthy salts, —in such a situation. Brick rubbish is a very suitable material for the roots of a great multitude of plants.

The three principal soils used in my garden are top spit loam from commons, coarse sand, and fibrous peat,—which is entirely a vegetable product. In these materials, alone or mixed together, the greater number of all plants may be grown. At Florence I learnt that rotten wood took the place of peat for camellias and azaleas, and on trial in this country I found it to succeed perfectly.

The supply of water to plants is necessary for vegetation. It is mainly supplied by the root ; and for every grain of solid constituents added to a plant it is found, by experiment, that about 250 grains of water must pass through it. It is fatal to many plants to move

them suddenly from a moist to a dry atmosphere, as the leaves cannot adapt themselves at once to the changed conditions.

The fate of many plants depends upon the amount of water supplied to the root. The health of an Erica cannot be maintained, except by the most careful watering; many plants are killed by being kept too dry or too wet, and the skill of a gardener is nowhere more shown than in his capacity for successful watering.

Plants will not, however, live with air and water alone. They must be supplied with nitrogenized compounds and mineral ingredients, particularly phosphates and salts of potash. The quantity of potash in the ashes of plants is large, but varying with each plant. In fir it is about half a part per thousand; in elm it is 4, in vine-shoots it is 5½, in fern it is 6¼, in bean-stalks it is 20, in wheat-straw it is 47, and in fumitory it is 79 parts in a thousand. In wine the potash is frequently deposited as cream of tartar on the sides of the bottle. Curiously enough, in sea-plants or plants growing near the sea, soda takes the place of potash; and hence it is usual to salt asparagus and sea-kale beds,—both of which plants grow near the sea.

Many plants contain silex, as the sugar cane, and various grass stems; and all plants of necessity require phosphates for their growth. Some chemists suppose that most earths contain an ample supply of the chief mineral ingredients required for plants. This, no doubt, is the case when top spit loam is used; otherwise the soil probably becomes at times exhausted of its mineral constituents. It is a lamentable fact that we have not yet sufficient knowledge of the exact mineral constituents of the various species of plants, much less of the exact quantity of salts which ought to be added to the soil.

It is curious that, although clay is so useful for the growth of most plants, there is no instance of an organic body having aluminium in its composition; but clay performs an important part in retaining various substances used by plants for food.

In the absence of more exact knowledge, the best mode of supplying the necessary food to plants is to use the excreta of animals. This contains all the changed matters of plants on which they have

fed; and we thus return to the soil the mineral constituents which the plants have taken away, and the earth regains that which has been lost.

We have employed the ashes of the burnt cuttings of trees over our vine borders with good success: we have also used dissolved bones for the same purpose. We have used ivory dust in large quantities, beneficially. But care must be taken in buying bones, as I once had some which killed every root which touched them, and which had probably been mixed with noxious chemicals. Lime, chalk, and brick rubbish have ever been found useful ingredients; and brick rubbish is one of the most valuable materials which can be used,—as the delicate Alpine plant, the rapid-growing vine, and the largest fruit-tree all delight to grow in it.

Nitrogenized matter must also be added to the soil. My garden is naturally so poor that it will not return the seed sown, without manure containing nitrogenized matter. Nitrogen, to a small extent, may be obtained from the air; though, unquestionably, the plant derives the greater part, if not the entire amount of its nitrogen from the soil. It may be derived from ammonia, a compound of nitrogen and hydrogen, and its salts; it may be derived from nitrates, compounds of nitrogen and oxygen; and lastly, it may be obtained by the direct absorption of nitrogenized animal or vegetable matter.

Vegetals are competent to take nitrogen directly from decomposing animal matter, which may be known by watering them with a solution of putrid matter. I have known asparagus to be so watered, but nothing could be more offensive than the vegetal when placed on the table. The cabbage tribe, which are gross feeders, are also offensive, and perhaps sometimes dangerous after having been so treated. For this reason at my garden all putrid manures are strictly forbidden; and stable dung, in an ammoniacal state, exclusively used. This is the best manure for a garden, and yields the finest flavoured vegetals. As of necessity our garden is compelled to yield large produce, so it is requisite to supply the ground with large quantities of manure.

Guano contains much ammonia with phosphates, as it is the droppings of sea-birds, which have accumulated on barren rocks for ages. We only employ it to a small extent, and then chiefly when we desire large onions. Guano is injurious to strawberries, causing the plants to run to leaf; and on the whole it had better be discarded from the garden, in favour of good stable manure.

I have employed woollen materials. When laid upon the surface of a pot, containing a fruit-tree, it keeps the earth moist. After a little time the roots form in it, and the whole becomes one tangled mass of rootlets. The wool rots, and the roots then become exposed, and are in the end destroyed by frost or drought.

When I saw this extraordinary result I forbade its use, but under certain precautions no doubt it may occasionally be profitably employed.

There appears to be an exception with respect to epiphytic plants, or plants without roots, which live on other plants. Take for example the dodder, which lives on clover and heath plants. These plants, however, twist round other plants, and hug them so closely, that the cells of one species come in direct contact with the cells of another. By this absolute contact of cells the salts are able to pass from one plant to the other, according to Graham's law of Dialysis. Professor Graham worked out the law of Dialysis, and separated all bodies into colloids and crystalloids. The first—such as gum and starch—do not readily pass through animal membranes. The second, or crystalloids—such as alkaline salts—pass through a layer of membrane impervious to water, as though it had no existence.

By this means a rapidly growing epiphytic plant encircles with its fatal embrace another plant, and pumps out by dialysis all its salts. The close manner in which the epiphyte attaches itself is well seen in a very curious plant brought from Chili by the missionaries, called *Cuscuta reflexa*, which lives upon the ivy and many of our greenhouse plants. A fine specimen was given to me by my friend Mr. Terry, and it is most interesting to see how firmly it attaches itself to the leaves and stems of other plants.

These considerations must influence our minds in the growth of orchidaceous plants, which grow in their native woods on living plants; and it has been a question with me, whether in our green-houses they are supplied with their requisite earthy salts; the whole matter requires to be experimentally worked out with care.

Notwithstanding our plants may have every material requisite for their nutrition and growth, yet they must be under the influence of physical forces. Every plant requires a definite degree of heat. One plant requires for its successful cultivation a heat little short of 90° Fahr., which we can obtain artificially; another plant lives at the tops of the snow-clad mountains, where it freezes every night in the year. Heat we can generate, cold we cannot regulate—or rather we never have regulated it as yet, though we could as easily circulate cold water as hot in our pipes. The learned Professor of Botany at Florence told me, that he found it impossible to grow Alpine plants in that city.

The changes which take place in the interior of plants are caused by the action of light, which enables them to reduce the carbon products,—such as gum, starch, and woody fibre,—from the carbonic acid of the atmosphere. The regulation of the amount of light to various plants, requires judgment and skill. Hard-wooded plants, as the peach and nectarine, require the fullest exposure to light; and I do not like my vines to have any shade. Some delicate plants like shade in the hottest part of the day. This is accomplished, in this country, by a light woven material to cover the glass; but at Paris by thin wooden laths painted green and fastened together by wire, so that the whole can be rolled up and taken away in autumn, when the intensity of the light begins to be feeble. Sometimes we wash over the glass with a pale blue tint to modify the warmer rays. In my garden all materials for shading are avoided as much as possible, but plants which do not bear a strong light are placed in a north aspect, exposed to the light of the sky, but not to the direct rays of the sun.

Experiment and experience has taught me to use more light even for ferns than has hitherto been considered beneficial, but then

the plants must be educated gradually to bear it. I have learnt a lesson from observing lady-ferns growing in the full blaze of the sun, and ceterach flourishing on Mount Vesuvius, and on the bare rocks of the Apennines near Florence, under conditions which would have led me to suspect that they would have been killed.

Light particularly develops the chlorophyl, or green colouring matter; and without light, vegetables are etiolated or made white. Some culinary vegetables are only used in this white state, such as sea-kale, celery, and endive, which are scarcely eatable when green, from the powerful flavours they contain.

For the full perfection of all fruit, the fullest exposure to the rays of the sun is necessary, and heat alone without light will not answer the purpose. A pear, peach, nectarine, or strawberry is worthless unless grown under the action of light.

The solar light is constituted of various rays. The violet or chemical rays, and the red or heat rays, are the two important rays for the horticulturist. Out of doors the preponderance of one ray over another is ever varying, as photographers well know; but, when we interpose glass between the plant and the sun, we find it desirable to choose glass with a slight green tint, as it is better that chemical rays should fall upon the leaves of the plant, rather than heat rays.

It is natural to expect that the influence of electricity or magnetism on plants should be considerable. My experiments have been negative upon this point, and we may say that nothing is definitely known up to this time, though it is possible, and even probable, that a plant placed under electric tension may have its power of leaf evaporation increased.

Plants supplied with the necessary materials for growth, and placed in a suitable temperature, and exposed to a proper amount of light, do not grow continually. They grow, they rest; they grow, and rest again. Rest is as necessary for plants as sleep is for man; but rest does not mean stagnation, as changes are doubtless still taking place in the internal economy of the plant necessary to its future welfare: but however that may be, no gardener can be successful who does

not know how and when to rest his plants. In tropical countries plants rest by the drought which alternates with wet. All plants require a season of rest, and it is probable that want of success in their culture more frequently results from ignorance of this fact, and of the peculiarity of their growth, than from any other causes.

In the cultivation of plants, we have different objects to obtain. We desire our lettuces and salad plants to be succulent and crisp, and therefore we grow them as quickly as possible, to prevent the development of woody fibre, which would cause them to be stringy. Our forest trees we grow for woody fibre or timber; our potatoes we grow principally for the starch they contain, and hence they must be fully exposed to light; our flowering plants are cultivated for blossom, which is obtained by affording the plant ample rest; but the highest aim of the horticulturist is to obtain fruit of fine colour, substance, form, and flavour, and this can only be accomplished after the blossom is set by a skilful adaptation of light, heat, moisture, and nourishment.

"I'll take the showers as they fall,
I will not vex my bosom;
Enough, if at the end of all,
A little garden blossom."—TENNYSON.

Vign. XI.—Scene on the Wandle, near Mitcham.

Fig. XII.—Wandle, near Beddington Corner.

CHAPTER V.

MY GARDEN TOOLS.

"Tum ferri rigor, atque argutæ lamina serræ;
Nam primi cuneis scindebant fissile lignum:
Tum variæ venere artes; labor omnia vicit
Improbus et duris urgens in rebus egestas."—VIRGIL, *Georgicon.*

A SKILLED gardener will do more with bad tools than an unskilled one with good tools; nevertheless, it is desirable that the garden should be supplied with the best mechanical appliances. In the division of labour which now exists we are required rather to select tools than to devise them; and the manufacturers of Sheffield tax their ingenuity to invent, and their skill to construct, such as shall be serviceable to the gardener and tempt him to buy.

Upon the question of tools, I have consulted Messrs. Spears and Jackson of Sheffield, who advocate the employment of steel for the construction of tools instead of weldings of steel and iron, as commonly used, because they say that flaws will sometimes occur in the union of steel and iron, and the steel has to be decarbonized to a certain amount to render it capable of being thoroughly blended with the iron. Most of the tools in my garden are made entirely of steel, and have been procured at their manufactory.

The one all-important garden tool is the spade (fig. 43). It should be strongly made of steel, and so firmly fixed in the handle that it shall not readily break. Some persons use spades made of steel and iron, with the intention that the iron may wear and the steel remain,

so that a cutting edge may be always maintained. This device has the merit of copying nature, as the rat's tooth is constructed of bone of two degrees of hardness, by which arrangement, as one part wears more rapidly than the other, a sharp cutting edge always exists.

It is curious that most South Europeans use a spade with a long handle, very dissimilar from our pattern. They get through a great

FIG. 43.

FIG. 44.

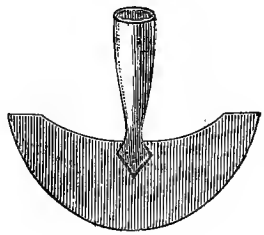


FIG. 45.

FIG. 46.

FIG. 47.

FIG. 48.

deal of work with these long spades by using their hands alone, but, as far as I know, this spade is never employed in this country.

There is a useful modification of a spade used for laying drain pipes which we employ (fig. 44). Another tool is used for cutting the edges of grass (fig. 45): for cutting off suckers, or digging out long-rooted weeds we have recourse to the spud (fig. 46), and, as a companion to the spade, the shovel (fig. 47) is useful for the removal of earth loosened by the spade or pickaxe.

For digging, the steel four-pronged digging fork (fig. 48) is also used, and smaller forks (fig. 49) are of great value to loosen the earth in our flower borders; in fact no other instrument should ever be used for that purpose.

FIG. 49.

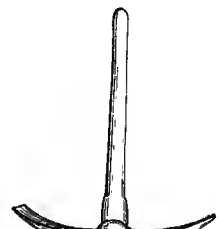


FIG. 50.

For gravelly soil we employ the pickaxe (fig. 50), an instrument pointed at one end and sharpened at the other, to cut roots. We also frequently use the mattock

which is like a pickaxe, but has a flattened transverse cutting edge at one end, and at the other an edge set in the opposite direction, and this is an instrument of great utility where large and strong roots abound. We also frequently have to use a heavy pointed iron bar for making holes in which it is desirable to insert stakes.

The hoe (fig. 51) is employed to destroy weeds and to let the air and dews into the ground. The amount of crop very much depends upon whether the hoe is hung up in the shed or employed on the garden. It pays well to wear out the hoe by fair use. An instrument called the Dutch hoe (fig. 52) is valuable in hot weather when

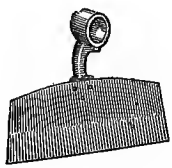


FIG. 51.

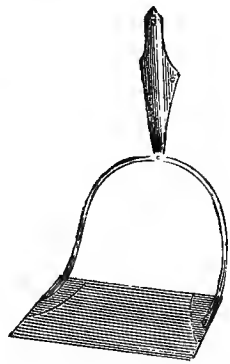


FIG. 52.

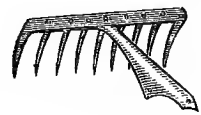


FIG. 53.

weeds grow fast, as a labourer can run it over the whole garden in a few hours, when every weed may be cut down to perish in the hot sun. Except for this purpose, it is an inferior instrument to the common hoe.

We employ rakes (fig. 53) rather more for ornamental than for

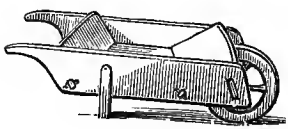


FIG. 54.

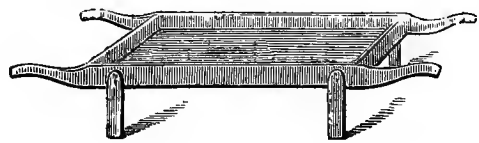


FIG. 55.

really useful purposes, as undoubtedly for most crops the ground is better left moderately rough, by which the roots are better aërated.

In a garden like mine, where alterations are constantly progressing,

a barrow is indispensable, and we find the common wooden form is the best (fig. 54). For carrying our plants or fruit a hand-barrow (fig. 55) is used, carried by two men, and it is pleasant to see the joy of the children when it arrives laden with strawberries and the other fruits of the season for the dinner-table.

Our large pots are carried by a chain placed round the pot and attached to a pole over the shoulders of the men. As we have the advantage of a lake, a punt is used to transport manure or plants from one part of the garden to another.

In my garden, where robust forest trees are intermingled with slender shrubs and tender plants, a variety of cutting instruments

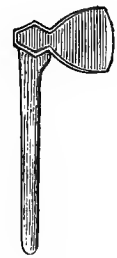


FIG. 56.

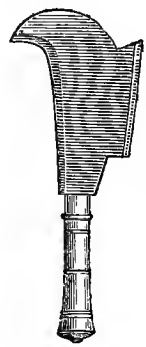


FIG. 57.

FIG. 58.

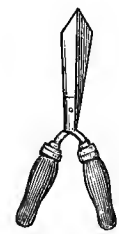


FIG. 59.

must necessarily be used. For cutting down trees the axe (fig. 56) is the chief instrument, and it is remarkable how a tree of a hundred years' growth yields to a few strokes of the woodman's axe, when properly wielded. In private grounds the cross-cut saw takes its place; but we have neither necessity nor desire for the frequent use of these implements. For the removal of the large branches we use chiefly a pruning saw; for the removal of the smaller a chopper or bill-hook is more handy (fig. 57); whilst for the pruning of mere shoots the gardener always cuts with a pruning-knife (fig. 58). The various forms of pruning shears are not approved, as they bruise the wood when unskilfully handled, and in this respect are inferior to a sharp knife; although garden shears (fig. 59) are almost constantly used for hedge-clipping.

A special form of shears is also used for grass-edgings (fig. 60). A particular form of knife is used for budding, the blade for making the incision, and an ivory handle for raising the bark (fig. 61). A special form of knife is made to cut asparagus (fig. 62), and a long pair of scissors (fig. 63) is useful to thin the berries of overladen bunches of grapes

FIG. 60.

FIG. 61.

FIG. 62.

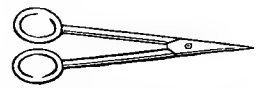


FIG. 63.

For sharpening the cutting instruments we have a grindstone. We sometimes cut the grass with a scythe, but prefer the mowing machine, of which there are many kinds now in operation. The one at my garden was made by Green (fig. 64), and has lasted satisfactorily for

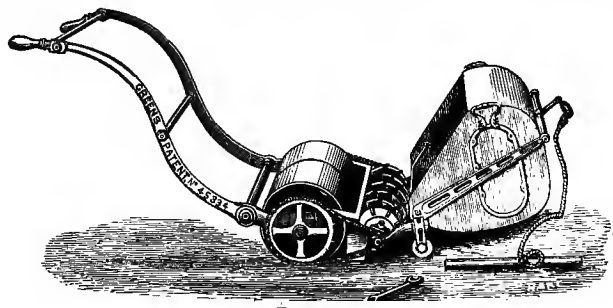


FIG. 64.

some years in constant work without any inconvenience. The grass lawn is essentially an English feature, and a lawn may now be kept by a good machine in a state worthy of its English reputation with only a moderate amount of labour.

FIG. 65.

FIG. 66.

FIG. 67.

For the removal of small plants the trowel (fig. 65) is valuable, as by it the earth about the roots is removed with the plant. We

have a very strong trowel (fig. 66) made of steel, with a piece of wood fixed on the steel for a handle. This is invaluable for the removal of wild flowers and ferns, and no lover of his garden should ever travel without it. I also always myself carry, in ferny countries, a strong steel instrument made in the form of a cross (fig. 67), and plants can be extracted by it from walls and stones with ease.

For planting, a dibber (fig. 68) is employed, and it is useful, as the gardener forcibly drives the earth against the rootlets of the plant, which much promotes the success of the operation. When trees or large bushes are removed, a wooden rammer takes the place of the dibber, but really it is nothing more than a large dibber to ram the earth against the small rootlets of the tree.

FIG. 68.

In every garden where there are many plant-houses the watering becomes a serious business, and especially so if water has to be procured from a distance. At my garden water is abundant, and therefore we have only to consider the hydraulic contrivances which we

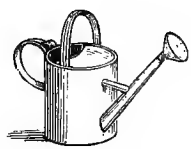


FIG. 69.

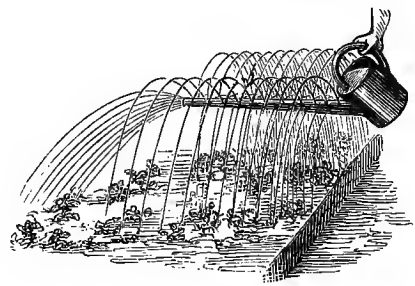


FIG. 70.

directly use for the purpose of watering the plants. We employ waterpots of various sizes (fig. 69), and another form lately invented which throws a fine jet of water over delicate plants (fig. 70). When we desire

FIG. 71.

that the water should dash against the plant and thoroughly wash the leaves to remove foreign matters, we use syringes. Reed's syringes are excellent. We use, besides, one of a very useful form (fig. 71),

an American invention, in which one tube works within another, and it may be used by the gardener with any amount of force which may be considered desirable. This latter has an india-rubber tube to be placed in a pail of water, by which arrangement a large quantity of water can be thrown in a short time. The orchard-house demands large quantities of water, and requires more powerful machinery. At my garden a Warner's pump (fig. 72) is used to water the orchard-house. It throws large quantities of water with such force, that no aphis can withstand it. The use of the pump involves a considerable economy of labour, and is thoroughly to be commended. It

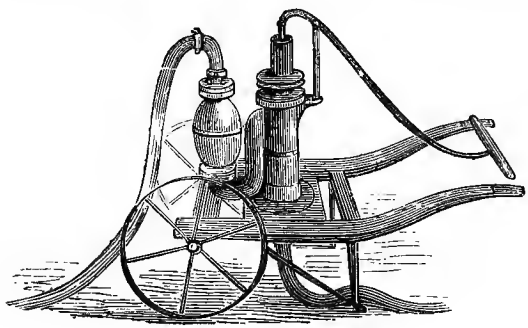


FIG. 72.

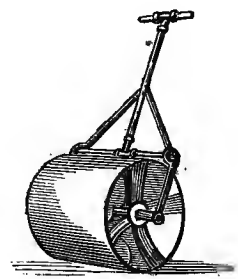


FIG. 73.

cannot be worked satisfactorily without two men to pump and another to manage the hose, but all the trees in the orchard-house can be thoroughly watered in a very short time.

In every garden a heavy roller is requisite (fig. 73). The frosts in winter raise the walks and destroy them, and the droughts of summer cause the loose stones to be separated from the paths. Under both these circumstances a heavy garden roller is necessary; and in early spring, when the worms have thrown up their casts, the grass is equally benefited by a heavy rolling.

In laying out gardens rods of five feet and ten feet are useful, and occasionally a square is a great help. A compass may be required to determine aspect, though the position of the sun at twelve o'clock always suffices to guide the gardener in this respect. Regularity of rows is secured by the line and reel, and questions of magnitude are

determined by the measuring tape. Sometimes we have had to employ a dumpy level to regulate the flow of water, and a spirit level must be considered as indispensable in every gentleman's garden.

Besides all these ordinary gardener's tools, I supply to my gardener a sledge-hammer, common hammer, files, mallet, chisels, gimlets, screw-drivers, pincers, wire-cutters, centre-bits, and plane. He also has the use of glazier's diamond, putty-knife, and materials for painting. Slight repairs can thus be immediately effected without the waste of time in having recourse to the village carpenter.

It is of very little profit to have a collection of trees without having them carefully and enduringly labelled. The direct system is to place the name on the tree. Various plans of writing on metal have been suggested, but they last but for a short period. I have tried a system of electrotype labels, but had some difficulty in getting them made regularly. A system has been adopted of stereotype; but at length I think that I have hit upon a plan to be ever hereafter used. The names are set up in type in the ordinary way, when instead of printing a sheet of paper a sheet of lead is indented by passing it through the press. The sheet of names is then cut up by a pair of scissors, the end is turned over, and a hole punched by the tool used by shoemakers to punch button-holes. When the label is finished

FIG. 74.

FIG. 75.

it is attached to the tree by a copper wire (fig. 74), and there is little fear but that these indented labels will endure from generation to generation. Where we have not these indented labels, numbers having reference to a book may take their place. A simple plan of notation in use by horticulturists is figured by Thompson (fig. 75). It constitutes a tally, which may be made by the gardener at once. I never used this plan myself, though I have often seen it adopted. When I use numbers, which I hope totally to abandon, I use a circular piece

FIG. 76.

of lead with a hole punched in it. This piece of lead (fig. 76) has the number struck with steel punches, with the required numbers, and a set of punches are kept for this purpose.

At my garden, earthenware labels are very extensively in requisition, especially for ferns and Alpine plants. I find, however, that frost frequently breaks them, a matter which the manufacturer should carefully consider. Wooden labels rubbed over with white lead and written upon with a lead pencil, answer perfectly well for ordinary crops lasting not more than one season. None of these plans are without their disadvantages, and for fruit-trees there is no better mode of retaining in perpetuity the names of trees than by making a plan of the garden and arranging the trees by orders. The position of any tree may always then be known, and even if one dies its place can be left vacant, and the name of any other may be determined by its relation to those around it. I always have used this plan myself.

Gardeners should always have a marking iron for branding the initials of their owner on all tools, that the ownership may at once be recognized, and that they may not be removed by mistake by casual workmen.

In the cultivation of all plants temperature is of primary importance, and for the estimation of heat and cold thermometers come to our aid. We have many thermometers, and every large plant-house should have several placed in various situations. For rough work, thermometers at about a shilling a-piece suffice, provided good instruments are at hand for comparison. For exact observation a set of tested instruments must be employed. First, it is necessary to have a minimum thermometer (fig. 77) placed an inch or two above the grass to determine the lowest temperature of vegetation at night. It is then equally important to learn the maximum heat of the sun, which is most conveniently done by a black bulb thermometer placed *in vacuo* in a glass tube (fig. 77). These two thermometers inform us of the extreme cold of night and the

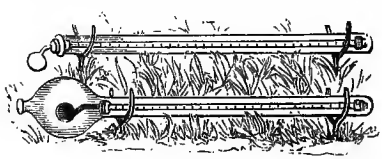


FIG. 77.

extreme power of the sun by day, but there are others to indicate the highest and lowest temperature of the air. These are placed under protection of a little shed (fig. 78), so arranged that neither sun nor rain can affect the instruments.

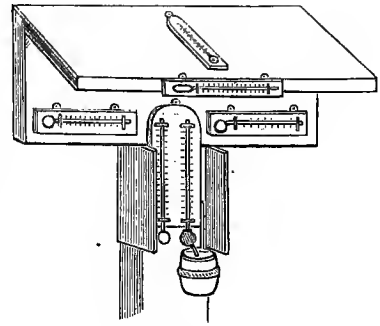


FIG.

My scientific instruments were made by Messrs. Thornthwaite of Newgate Street.

Visitors are requested never to touch these instruments; but, as I well know the tendency of all Englishmen to see with their fingers, two or three common thermometers are placed on the stand to draw away their attention from the real instruments of observation. Some years ago I designed a thermometer to use with an electric current to determine at a distance any deviation of limit of temperature in houses; thus a gardener may have, in his bed-room, an instrument to show the temperature of every plant-house. This was perfectly successful; but it has not been employed at my garden.

The drying power of the air is estimated by the difference of temperature shown between a dry and a wet bulb thermometer; as the greater the difference, the greater the dryness of the atmosphere. The bulb is kept wet by a covering of silk, the end of which dips in distilled water. This contrivance is called Mason's hygrometer, and is shown in the centre of our meteorological observatory (fig. 78).

It has always appeared to me advisable to determine the amount of evaporation which takes place in a definite time, as that has an important bearing upon vegetation. For this purpose I employ a tube graduated to one-tenth of an inch (fig. 79), which shows how much water evaporates per week. These evaporations are calculated to lead to much valuable information, and are nearly as important as thermometers. To determine the amount of rain which falls week by week, we use a rain-gauge, the result of the observations of which is given in the calendar of my garden.

FIG. 79.

We have a barometer at the garden: for horticultural purposes it is nearly useless, as the influence of variation of atmospheric pressure on organic beings is unknown. When it suddenly varies to any great extent, the gardener should then beware of storms, and make all tight before the hurricane arrives, or his roofs may be taken off, as mine have been, in a sudden squall.

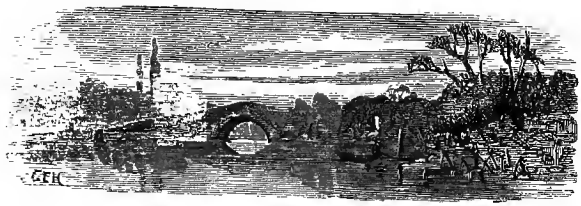
The gardener ought ever to have at hand a pocket magnifying glass to examine the leaves of his plants, as by its aid fungi and insects may be detected, and their effects prevented.

When the gardener has all the tools which I have described, he is possessed of all that can be reasonably required to conduct his garden with success and profit.

"Strength may wield the ponderous spade,
May turn the clod, and wheel the compost home;
But elegance, chief grace the garden shows
And most attractive, is the fair result
Of thought, the creature of a polished mind."

COWPER'S *The Garden.*

Vign. XIII. Old Pigeon House, Beddington Park.



Vign. XIV.—Scene on the Wandle.

CHAPTER VI.

MY FRAMES AND GLASS-HOUSES.

"Th' uplifted frame, compact at every joint,
And over'laid with clear, translucent glass,
It settles next upon the sloping mount,
Whose sharp declivity shoots off secure
From the dash'd pane the deluge as it falls."—COWPER.

THE amount of vegetation which can be obtained in any glass structure is strictly limited by the extent of surface of glass exposed to the light; hence, when we desire, in this climate, many plants out of their natural season, or which grow in a warmer climate, we must have a proportionately extensive amount of glass.

A great deal can be done with glass lights eight feet by four, which may be conveniently arranged in groups of twos, threes, and fours (fig. 80). The structure is very simply made. A strong stake is driven into the ground at each of the four corners, and on the

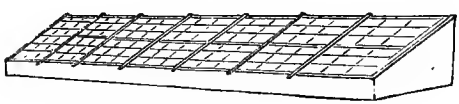


FIG. 80.

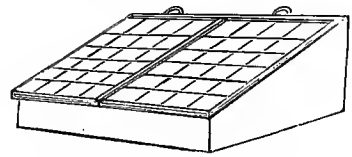


FIG. 81.—Two-light Frame.

outside slabs of timber about $\frac{3}{4}$-in. thick are nailed to these to form the walls, and over the whole a wooden frame is placed to receive the lights.

It is desirable to ascertain the water-level or drainage before the frame is made and the ground should be excavated to about three inches of the highest level to which water ever rises. The excavated earth should be thrown outside the structure, so that the whole is firmly embedded in the ground, which preserves a uniform temperature in cold weather. Many desirable plants, such as azaleas, can be well preserved in the coldest weather by simply covering the lights with matting.

In these frames the cauliflower and lettuce plants are kept through the winter to be planted out in early spring. In winter, endive and late cauliflower plants are preserved for use. In spring, strawberry plants placed in them yield an abundant crop in May, after which tomatoes are planted for summer use. Melons and cucumbers are also produced in abundance in them in summer. Delicate plants are housed in them during the winter, and protected by them in the spring and autumn; and large specimens of geraniums and fuchsias attain the highest perfection of growth during the summer.

My surface of cold frames extends to no less than 1,600 superficial feet of glass; and we have besides three or four two-light boxes (fig. 81), eight feet by six, useful for hot-beds,—or, when turned to the north or east, valuable for the protection of seedling ferns, which require to be shaded from scorching suns and blasting winds.

During the present season I have experimented on a frame of four lights with a tank underneath for hot water; and another frame heated with a single pipe, the heating apparatus of which will require minute and specific description.

Another glass structure exists at my garden, which is really nothing more than a large frame, so constructed that the gardener can get in and walk along. We call it the POOR MAN'S HOUSE (fig. 82), because it is erected so cheaply and answers so efficiently. To construct a Poor Man's House, a hole is sunk in the ground $2\frac{1}{2}$ feet wide and $2\frac{1}{2}$ feet deep, and the earth so removed is placed at the back of the house. If the water-level of the ground permitted, and drainage could be procured, the whole interior of the house might be lowered

two feet more; by which device the house would be well sunk in the ground. A single glass roof is fastened over the sunk part, and ventilation is provided by a board hung upon a hinge at the back.

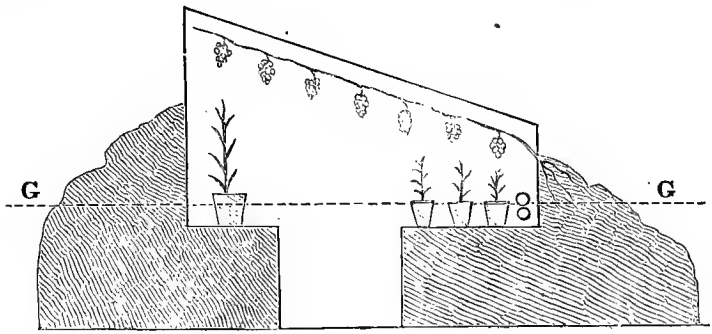


FIG. 82. - Poor Man's House.

My Poor Man's House is forty-eight feet long, and the width of the glass roof is ten feet, the door being at one end (fig. 83). Perhaps in future structures, where there is plenty of earth for the back, it would be desirable to increase the width to twelve feet. Vines are planted which yield abundance of the highest-flavoured grapes, lasting from

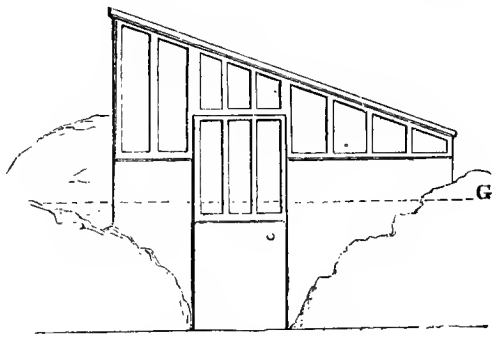


FIG. 83.—End of Poor Man's House.

July till November, when the vines are cut, and the house is filled with geraniums, azaleas, and camellias; these give lovely flowers till advancing spring produces plenty of flowers in the open air.

The house is lighted exclusively from the roof, and thus a maximum of light is secured with a minimum of cooling surface. From the earthen walls, the air is always kept in a proper hygrometric

condition, and as a result of the whole arrangement healthy vegetation is secured with the least possible amount of artificial heat. My house has only two 3-inch hot-water pipes, and many plants may be grown in it without any heat. No one who loves plants and likes to see them grow should be without a Poor Man's House; for there is no method in which so much pleasure may be obtained with so small an outlay.

Passing from the Poor Man's House, which everybody should have, we have to examine my Orchard-house: this is simply a luxury, and may be more easily dispensed with. My orchard-house (fig. 84) is literally a glass shed, in which fruit-trees and plants are grown

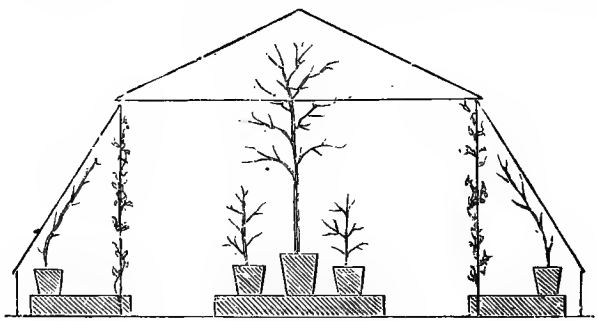


FIG. 84.—Orchard House.

between March and November. It is about eighty feet long and fifteen feet wide, and arranged due north and south, so that the sun shines through the east side of the house in the morning before twelve, and through the west side in the afternoon. My orchard-house is not placed in a sufficiently open situation, as there are trees within 150 feet of it, which shade it from the rays of the sun in the early morning. It is desirable so to place an orchard-house that it may catch the first rays of the rising sun, and the last of the setting, so as to perfect the flavour of the fruit.

My orchard-house is ventilated by boards on hinges, passing from one end of the house to the other below the glass. There are ventilators also at the top; but if I constructed a house regardless of expense, I would completely throw back the glass in summer, and only close it in cold nights or in stormy days.

The orchard-house is no protection against frost in winter, as it freezes as sharply in the house as it does out of doors; and it is to be particularly observed that, as the trees do not get a covering of snow, the roots in pots of only half-an-inch in thickness are liable to be more injured than if the trees were planted in the open ground.

An orchard-house should be constructed so strongly as to resist great gales; otherwise the uprights and roof might be arranged much in the same way as a barn. My form is convenient, but perhaps would be better if each portion of glass were a little longer,—say eight feet instead of seven.

The orchard-house is essentially the device of Rivers, who deserves the thanks of pomologists not only for its invention, but also for the zeal with which he has enforced its use. Various plans are adopted for its design. Rivers uses a simple double span with wooden sides, and certainly this is best adapted for his own use, where numerous trees are grown for sale. I rather incline to the common design of a country shed with glass roof, as thus it is made of great strength. My own house is a span glass roof supported on pillars, with glass sides shelving from it. The glass of the span is seven feet long, and each side is seven feet, so that there are twenty-eight feet of glass from side to side. The doorway is 6 ft. 6 in. high. Perhaps thirty-two feet of glass would make a more perfect house on this plan. Ventilation is secured by opening the door, by opening windows over the door, by opening a board upon a hinge extending under the glass through the whole length of the building on either side, and by opening one or two panes of glass along the roof.

At the end of the orchard-house there is a glass span-roofed shed which is used from early spring till autumn for flowering plants and ferns; and no structure can answer better, or show more beautiful flowers, than this house during that period. Here lilies, fuchsias, geraniums, azaleas, and similar flowers flourish. There is no heating apparatus attached to the orchard-house, as these large glass sheds would be most expensive to warm. I have been able to keep out frost, however, from the glass shed at the end of the orchard-house,

by the use of paraffin lights placed under a zinc trough filled with water. This plan can only be commended to keep out frost if the glass be covered at the same time with mats.

The orchard-house is a luxury where there are no walls. It has never failed to give me a fair crop of fruit but once,—in 1869, when I had but small produce. In that year orchard-houses failed throughout ngland: but two trees, out of doors, gave me as large a proportionate crop as the orchard-house. Orchard-houses have the drawback of requiring much labour in watering and syringing the trees, and udgment in the extent to which ventilation and water should be administered to secure the due flavour of the fruit. Where there are walls, more fruit can be secured for the same labour; and the flavour of the fruit and its capability of carriage are, on the average, better secured on outside walls than in the interior of the orchard-house.

There is a glass-house in the Horticultural Society's grounds, where a railroad is laid from the house to the open air; the side of the house is contrived so as to open, and the orchard-house trees are supported on a railroad truck, so that the whole can be wheeled into the open air or back into the house in a few minutes.

Passing from the cold houses or glass sheds, my Fernery (fig. 85) next demands description. It is about 80 feet long, and has about sixty

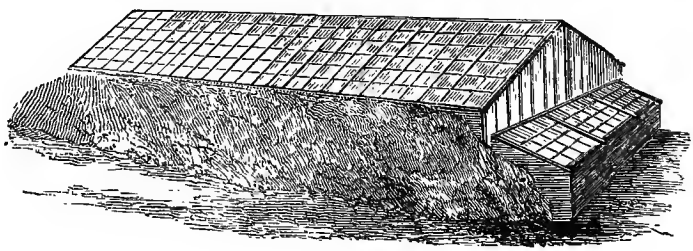


FIG. 85.—Fernery.

rafters. The glass faces the north, and the whole house being well sunk in the ground, has very much the appearance of a long frame. The door (fig. 86) is at the back of the house, on its southern aspect, so that the northern side presents an uninterrupted surface of glass, through which the light of heaven from a clear northern sky penetrates.

Plate 19.

The southern side is chiefly made of boards covered with tarred asphalted felt, which is a bad conductor of heat and a great protection against rost. In conformity with more extended experience of the value of light to ferns I have placed some glass on the southern side; but trees have been planted in front, so that in summer the leaves keep off the rays of the burning sun. In winter, however, when the leaves have dropped, abundance of light penetrates into the house through their naked branches, to the great benefit of the plants.

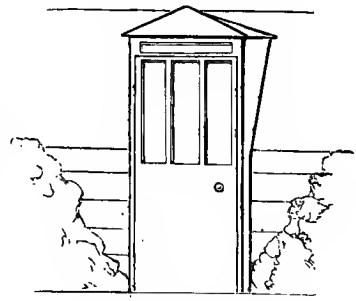


FIG. 86.—Door of Fernery.

A stream of water runs through the fernery, which is dilated, at one place, into a pond, and though the house is a mere roofing of glass supported on posts, it is universally admired as a very beautiful place: Mr. Robertson has very faithfully rendered it in his drawing (plate 19). The view of it is taken facing the west—the instant the house is entered; and the little bird in it is one of the poor frozen birds caught during the snow and ice of winter, which luxuriated and cleared the house of insects, but which flew away to its native haunts as soon as it could find a hole through which it could escape.

In this house I desired to grow ferns from all parts of the world, that they may be seen at a glance; and thus I required a house varying in temperature from the tropical to the temperate climates. It requires much thought to obtain this result in any given house, especially where currents of air and draughts are objectionable. The result has been perfectly obtained on the first design, by raising the floor at the warmer end, by placing more rows of hot-water pipes in the part of the house between the door and the end desired to be warmer, and by preventing the currents of hot air traversing the length of the roof by the interposition of screens of climbing plants. The transition in winter from this lovely scene of ferns and flowers to the equally lovely scene outside of frost and snow is enchanting. Plate 19 shows the beauty inside; the tailpiece of this book (vign. xxxi.) shows the aspect of the country

and view which is presented the moment the threshold is crossed. To obtain these effects they must be designed; and with me it is difficult to decide which is the more enjoyable, to contrive the picture or to contemplate it when made.

For the construction of the roof of the fernery, a deal plank was split into three parts, each of which constituted a rafter, and on the edge a portion was cut away to receive the glass. The rafters were not even planed but had before glazing three coats of anti-corrosive paint. I place great importance on this thorough painting before glazing, as it is a material aid to the adhesion of the putty. After glazing, two more coats of paint were used, as it is inconvenient to repaint a house full of plants.

The Fernery and Poor Man's House are placed near together, and heated with one saddle-boiler, and a third very small house is added for propagating plants. This is warmed by a large iron tank placed by a flow and return pipe in connection with the boiler. By this plan the hot-water system is supplied with a large quantity of water, and thus the gardener has abundance of warm water at hand by which he can water his plants without chilling them. The cistern must be filled up once or twice a week, according to the demands made upon it.

We have at another part of the garden a second group of houses, one a late vinery divided into two parts. In one portion the glass is arranged in two pitches, as though it were one-half the orchard-house placed against a wall (fig. 87). The second half of this vinery has a simple glass roof, like that of the fernery, but this has a south-west aspect instead of a north-west. Ventilation in the two-pitched house is obtained by a board in front, and by two moveable frames of glass at top. In the flat-roofed house ventilation is obtained by openings in the back wall, about a foot below the glass. In these houses we keep grapes till February. In this group of houses we have a small cucumber-house, with a glass roof supported by

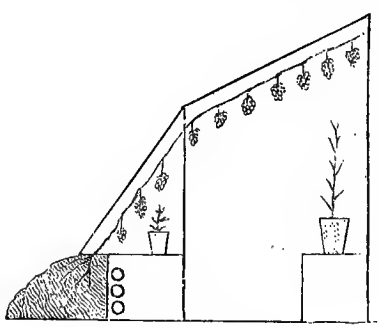


FIG. 87.—Vinery.

walls, the aspect being due south, to catch every ray of sun in winter and in front of this we have a frame in which we grow a few nice pines every year, which add to the variety of our produce.

All my structures are of the simplest construction possible, and I can most strongly recommend for all practical garden purposes glass-roofed, shed-like structures. For the same cost they can be made much larger, and can have their air more readily changed than any other; they also require less combustion to maintain a similar amount of heat when sunk in the ground, and can be more readily altered in form when desired.

When glass-houses are attached to dwelling-houses, or are appendages of drawing-rooms, they must of necessity be architecturally constructed. In such houses the growth of the plants is of necessity secondary to the general design of the house. In fact, for these houses the majority of plants ought to be grown elsewhere, and placed in the house when in their prime.

Besides our large glass-houses, Ward has taught us how to construct miniature houses for delicate plants, and for the carriage of plants from the distant parts of the world. A Ward's case is essentially a glass covering placed over a vessel containing suitable soil. At my garden a single glass is placed over the lovely Tunbridge fern. In my drawing-room *Todœa superba* grows in a Wedgwood pan covered with a glass shade. In my dining-room I have two cases which were made after the pattern of Mr. Ward's in Wellclose Square, nearly thirty years ago.

To grow plants successfully in a Ward's case, we must have regard to the quality of soil, the heat, the light, and the moisture of enclosed air. The door should be opened occasionally for a short time, water should be given with care, the powerful rays of the sun should be avoided. Anyone who studies the philosophy of horticulture cannot fail to succeed with a Ward's case, for all plants delighting in a moist atmosphere.

Of late years glass frames, called curates' vineries, have been employed, but they are incomparably inferior to the Poor Man's House. Square earthen vessels (fig. 88) have been made by Looker

which are useful to imbed entirely in the earth, as the warmth of the earth protects delicate plants. The larger structures with loose pieces of glass for vineries are, however, of questionable utility, and

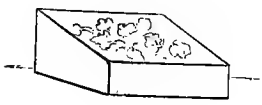


FIG. 88.

FIG. 89.

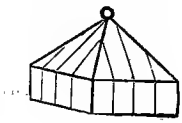


FIG. 90.

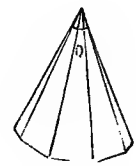


FIG. 91.

cannot be commended. For protection of plants in early spring the French use *cloches*, or glass bells (fig. 89). In England a square iron-framed glass is much employed (fig. 90), and in the West of England an octangular structure of glazed zinc bars (fig. 91) is much employed by market-gardeners, and has been found useful at my garden.

Any gardener who has all the variety of frames and glass-houses which we employ has only to use them with horticultural skill to obtain satisfactory results.

VENTILATION OF GLASS-HOUSES.

The philosophy of ventilation, or change of air, in glass-houses is fully considered in my garden, as the health of the plants in great measure depends upon it. Firstly we rely upon the property of diffusion, a power whereby one gas in contact with a second diffuses itself rapidly throughout the second. An example of this may be seen in a soda-water bottle, which is full of carbonic acid. This gas, although much heavier than the air, diffuses itself through the air in a few hours against gravitation. In a greenhouse the intervals between the pieces of glass and little holes in our woodwork play an important part in enabling the foul air of the glass-house to escape.

Besides the property of diffusion, we take advantage of the difference of density of hot and cold air. Hot air is light, cold air is heavy; hence by admitting cold air at the bottom of the house and warming it, it becomes light, rises to the top, and escapes by any aperture. This

is easy in theory but difficult in practice, as plants and all organic beings when at rest can very ill bear the air in motion.

Whenever any portion of the air of a glass-house is cooled, it becomes heavy, and falls; whenever it is heated, it becomes light, and rises. In a cold night the pipes are at 100° Fahr., the glass down to 10°: consequently the air which touches the pipes expands, becomes lighter, and rises rapidly; the air which touches the glass cools, becomes denser, and falls to the bottom of the house. In any large greenhouse the descent of the chilled air in a cold night is apparent to the senses.

From the weight of the cold air it is advisable that, as a general principle, a considerable part of the heat should be applied as low as possible. In a long house with excess of heat at one end the hot air rises and travels along the roof; whilst the cold air falls and returns by the floor to the source of heat, where it again ascends.

In making arrangements for the heating of any specified house, the engineer should well consider all cooling surfaces, for he may be sure that the cold air from all such situations will fall to the floors as certainly as bullets would, if dropped from a similar position.

In my Cucumber-house (fig. 92) and Melon pit, I let air into the house in contact with the hot metal and warm water. This in effect puts a pressure upon the air of the house, and the vitiated air escapes through every little crevice in the glass: this is a very safe system in cold weather.

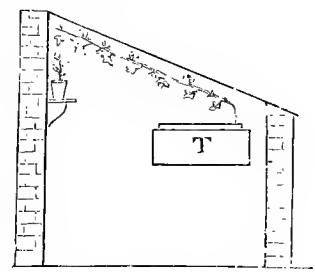


FIG. 92.—Cucumber House.

In all ventilating and heating arrangements, it is essential that the air should preserve its moisture, and my evaporators are useful to determine this point. When we warm the air it becomes too drying, and we must add water; and we do this at my garden by using open heated tanks of water, and by employing iron troughs arranged at the top of the pipes.

On a cold night, the air when heated by the pipes rises to the glass. It deposits aqueous vapour on the glass, and becomes drier.

It then falls and becomes heated again, and the process is repeated till the air becomes so dry as to be hurtful, and thousands of plants are annually destroyed. This we avoid at my garden by continually supplying to the air an amount of moisture judiciously adapted to the peculiarity of the plants.

WARMING OF GLASS-HOUSES.

The simplest mode of obtaining artificial heat is by the use of hot dung. The fresh dung from our stable is moistened with water and turned over several times, for the sulphur and other coarser products to be exhaled. Whenever leaves can be procured and mixed with the dung, they moderate the heat and cause it to last for a much longer period, and hence we use this mixture for our early potatoes. When the frame is made up the first fiery blast is allowed to pass off, and the gardener ascertains the proper time to plant by inserting a stick into the materials of his hot-bed. The heat after a time abates, when he uses a lining round the frame to maintain in early spring the necessary temperature. Sometimes fermenting materials are used in houses for forcing grapes in early spring, but I have never myself so applied them.

Spent tan is employed, especially for the growth of pines. It is particularly liable to facilitate the growth of the tan fungus, and, therefore, we only employ it in our little pine-pit.

In all systems of warming by the combustion of coal, coke, wood, oil, or naphtha, the heat developed bears a relation to the amount of the matter consumed; hence all that an engineer can effect is to regulate the application of the heat when generated. He cannot in effect generate heat without a corresponding change of matter.

From the time of the Romans rooms have been heated with flues, and within a few hundred yards of my garden they were employed nearly two thousand years ago. By this plan the direct heat of a stove is carried round the house in brick flues. This plan I have not used, as modern science has directed us that it is better to have our fireplace for

the generation of the heat and to pass the heat to hot water, by which it may be carried to any place and in any direction we please.

In all systems for the circulation of warm water a boiler is necessary. The principle upon which this should be constructed is to afford so large a surface of metal to the fire that all the heat generated should be transferred to the water. It is also desirable that the capacity of the fireplace should be so large as to hold enough fire for twelve hours' consumption. All horticultural boilers should be of the simplest construction. For moderate heating power a simple circular boiler has answered very well with us. Where a larger boiler is required, we have found the saddle-boiler (fig. 93)

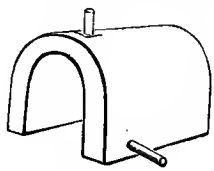


FIG 93.

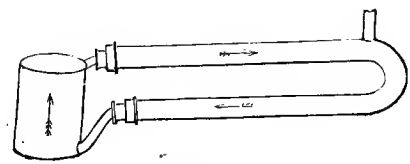


FIG. 94.

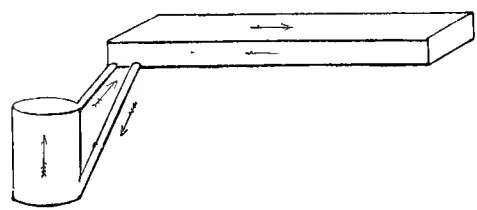


FIG. 95.

unexceptionable; and had I a large range of buildings to warm, I should certainly have recourse to the Cornish boiler in preference to any other. There are innumerable forms of tubular boilers, and amongst them some complex boilers which some of the first horticulturists condemn, and which certainly I should never myself use where a choice existed.

In all cases the water enters the bottom of the boiler by a pipe. The water becomes heated, expands, rises to the top, and flows by a second pipe from the top of the boiler (fig. 94). At my garden the heated water is used in two methods,—one by causing it to flow in hot-water pipes in the ordinary way, and by the second (fig. 95) connecting

the pipes with a cistern of water. The warm water rises immediately to the top of the cistern and the cold water passes to the stove. This latter method, I believe, originated in my garden, and for the growth of orchids and pine-apples should exclude other plans.

Two boilers are at work with me, one a saddle boiler heating the fernery with three hundred feet of 4-inch pipes, the cutting-house with a tank holding about two hundred gallons of water, and the Poor Man's House with about a hundred feet of 3-inch pipes. The second boiler heats the cucumber-house with a tank holding about two hundred gallons, and the grapery is heated with about two hundred feet of three 4-inch pipes, and a small pine-pit with about forty feet of 4-inch pipes.

During last summer a portable boiler has been employed to heat a tank for a melon pit (fig. 96), where the mould (M) is placed on

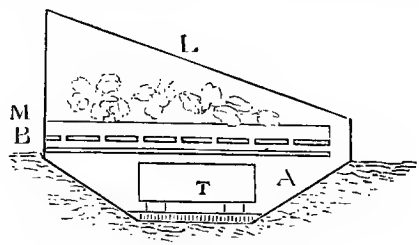


FIG. 56.—Tank Pit.

boards (B) over the tank (T), and a current of air is allowed to play over the water into a chamber from whence it rises to warm the upper part of the pit covered with the light (L).

In the arrangement of pipes it is usual for the water to flow along the top pipe and return by a lower pipe, as represented at fig. 94. It has been proposed, however, to make the water flow by the lower pipe, then through the higher, and rapidly descend to the bottom of the boiler (fig. 97). This plan has been recorded as in use at Deptford, and assuredly would be adopted by me, but that it is difficult to sink the fireplaces sufficiently low at my garden.

At my pine-pit it is necessary to cause the water to circulate below the level of the boiler. This is effected by causing the water to flow into an open pipe, and then turn down to the desired level

(fig. 98). This plan should never be used unless it is imperatively necessary, for the rule to be observed in arranging all hot-water pipes

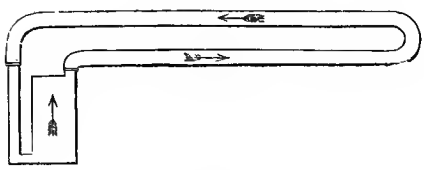


FIG. 97.

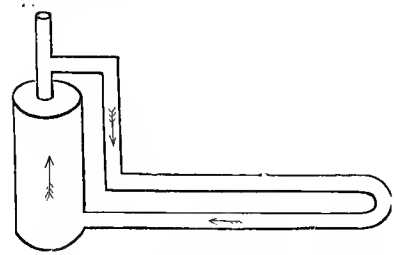


FIG. 98.

is for the water continually to rise till it has done its work, and then to fall to the stove to be re-warmed.

At the highest part of the pipes a small cistern is generally placed. At my garden, in my systems of warming I have cisterns holding hundreds of gallons of water, so that the gardener has always the command of warm water to water his plants.

Hitherto hot-water systems have always been arranged by a flow and a return pipe; however, I conceived the idea of using a single pipe arranged with a gradual rise. I have a frame heated with a single pipe ; the hot water flows along the top of the pipe and returns along its lower surface, thus having two currents in an opposite direction traversing the pipe at the same time (fig. 99). The

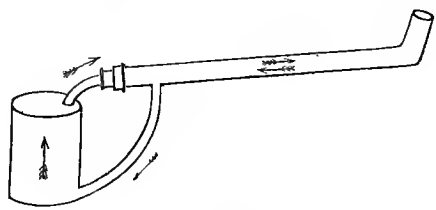


FIG. 99.

circulation proves excellent and rapid, and answers most efficiently. I can strongly recommend its adoption in every case where a single pipe is competent to communicate sufficient heat.

In warming any house, it is desirable to have an excess rather than a deficiency of heating surface, and the pipes should be placed in those situations where the cold air can be immediately brought in

contact with them. In my fern-house the distribution of heat is very peculiar; a great increase of heating surface is placed in one end of the house: otherwise, as a general rule, the pipes are placed in the ront of the lean-to houses, but in very large houses they require to be distributed in several positions.

Our appliances for warming far exceed those in use at the time when Evelyn wrote, who says: "If the season prove exceeding piercing, which you may know by the freezing of a moistened cloth set in your greenhouse, kindle some charcoal."

During the past year, as a matter of experiment, paraffin oil lamps have been employed to give warmth to keep out the frost. The plan can be made to answer, but whenever this mode is adopted it is desirable to place them under a zinc trough filled with water, that moisture may be supplied to the air.

FIG. 100.

I have always feared an accident on a cold night, when I might lose all my plants; I therefore applied to Messrs. Field of Lambeth to make me a number of large candles with two wicks (fig. 100), to keep for any emergency. It is possible that they may not be wanted for years, nevertheless no one ought to be without some means of keeping out frost, should any sudden failure of his hot-water apparatus occur. Messrs. Field have also sent me some large flat night-lights, designed to last for twelve hours, and I do not doubt that one or two are sufficient to keep the frost from a two- or three-light frame during the coldest night.

The *Spectator* observes that a kitchen garden is a more pleasant sight than the finest orangery or artificial greenhouse; but this does not accord with the ideas of the poet, who writes that

> "Who loves a garden, loves a greenhouse too.
> Unconscious of a less propitious clime,
> There blooms exotic beauty, warm and snug,
> While the winds whistle, and the snows descend."
>
> COWPER.

Vign. XV.—Carshalton High Street.

CHAPTER VII.

THE PROPAGATION OF PLANTS.

"Then let the learned gard'ner mark with care
The kinds of stock, and what those kinds will bear;
Explore the nature of each sev'ral tree,
And, known, improve with artful industry."—DRYDEN, *Georgics.*

WE propagate plants by all the well-known methods usually practised. Many plants are exclusively raised from seed (fig. 101), such as the majority of our vegetals. To secure proper germination we take care that the seeds (fig. 102) are exposed to

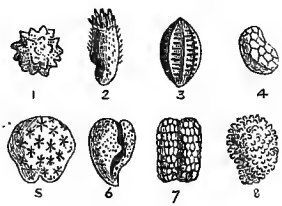


FIG. 101.

1. Eschscholtzia californica.
2. Corn blue-bottle Centaurea cyanus).
3. Oxalis rosea.
4. Papaver somniferum (opium poppy).
5. Stellaria media.
6. Sweet William (Dianthus barbatus).
7. Foxglove (Digitalis purpurea).
8. Saponaria calabrica.

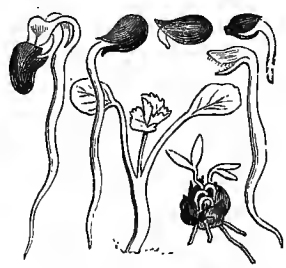


FIG. 102.—Seeds germinating.

warmth, moisture, and air, as without these three conditions combined seeds will not germinate, and either cold, dryness, or exclusion of oxygen will surely stop their growth.

After the seed has sprouted light is necessary, and care is required, especially with melon and cucumber plants, as soon as they have

sprouted, to place the young plants close to the glass, that they may have the full effect of light. Every seedling is an individual, having certain characteristics, deviating in some degree, and within certain limits, from a fixity of type. By selecting seedlings having particular characters, and again by continually selecting from their progeny, the gardener obtains those deviations from the original type which are known by the name of florists' flowers,—or gardeners' fruits.

A question has arisen whether selection alone is sufficient to procure new plants, or whether it is desirable to cross the seed of one plant with the pollen of others. Mr. Rivers tries the latter plan to improve our peaches and pears, and he crosses a plant having one good property with the pollen of another having other desirable qualities. On the other hand, I am assured by raisers of florists'

FIG. 103.—Sucker.

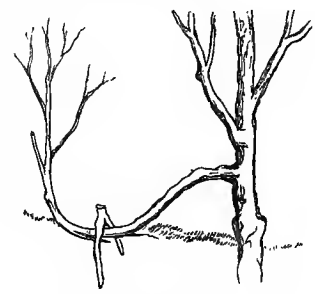


FIG. 104.—Layer.

flowers, that it is generally better to rely upon sowing simply the seed of good sorts and upon selecting from their produce. In the present state of our knowledge we had better try both methods, when we desire to raise new varieties. Many of the best varieties of fruits are certainly natural sports.

Sometimes selected plants of high quality are again propagated by seed, such as our choice varieties of peas and beans. More often, however, we have to multiply the original plant: to such an extent can this be done, that the delicious Jargonelle pear is supposed to have been raised by the Romans, and handed down to us by a continuous propagation.

Various methods are practised at my garden for the multiplication

of the parent plant, so that its properties are retained with its individual peculiarities, defects, or excellences. First of all, we propagate by suckers, as many trees—such as the elm, plum, and quince—throw up other trees from their roots. It is only necessary to sever one of these little trees (fig. 103, A) from its parent, to obtain another of the same variety. Where suckers do not spontaneously arise, a branch is layered in the earth and securely pegged down. This after a time roots, and, when severed from the parent, forms a duplicate tree of the same kind. We favour the production of roots by partially cutting across the bough where it is laid in the earth (fig. 104). There is a process much like layering, which is frequently used on the Continent, and which is sometimes used by ourselves, called circumvallation (fig. 105). A shoot of a living tree is placed through

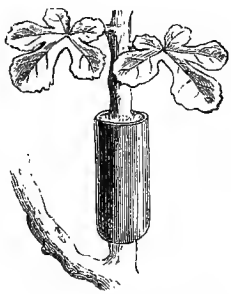


FIG. 105.—Circumvallation.

FIG. 106.—By Roots.

a pot which is filled with earth or cocoa-nut fibre: this is kept continually moist till a mass of roots is formed, which causes the branch to become a second tree. I generally place a piece of wire tightly round the branch below the insertion into the pot, and gradually cut away the stem, both of which operations appear to me to facilitate the production of roots.

Lately I have been trying other methods of circumvallation. A piece of gutta-percha tubing about eight inches long was slit down and made to cover a branch; the slit was then closed with a warm iron, and the bottom closed in the same way. The inside was filled with cocoa-nut refuse and kept damp, when in a short time

abundance of roots were produced. I am now wrapping a piece of the waste edge of flannel round active shoots, and then encircling the whole with a piece of sheet india-rubber, leaving the upper part open to be watered every day. In both of the above cases I have strangulated the shoot, below the part operated on, with a tight copper wire, to stop the descending sap. But further experience is required before the latter processes can be recommended.

Sometimes we obtain a plant from a root. The roots of the root-work in my ferneries occasionally grow (fig. 106). Although this is not a usual mode of multiplication, yet it may be at times employed. The roots of a fig-tree often sprout.

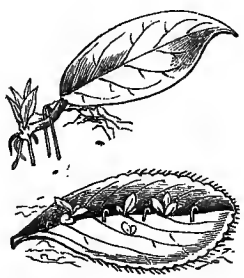


FIG. 107.—Propagation by Leaves.

FIG. 108.—Cuttings (Pink and Geranium).

We frequently propagate by leaves (fig. 107). The *Hoya carnosa* may be propagated from a leaf. A leaf of a *Gloxinia*, if pegged on the ground, would form many buds and give rise to as many plants, and every plant would be identical in character with that of the parent plant. Leaves of *Echeveria* placed in a pot of sand would also grow.

We multiply many plants by cuttings, such as pinks, geraniums, tea-roses, poplar-trees, and cucumber plants. We cut them at a joint (fig. 108), or slip a shoot off the parent stem, as at such a point there appear to be many dormant buds capable of becoming roots. The cuttings are then inserted into a pot of sand, or, what is better, into cocoa-nut refuse. In this material, kept moist and aided by gentle warmth, a geranium cutting will make a good plant in two weeks. Cuttings of poplars or laurels are inserted three or four inches in the

ground, and take longer time to root. Grape vines are generally propagated by eyes (fig. 109). A plump bud is selected with a piece of stem on each side. The eyes start and make a strong vine. It is necessary to have a piece of the wood attached to the bud to ensure growth, as I tried a vast number of buds without wood, of various trees, but not one grew. We always shade cuttings from the direct heat of the sun's rays, and ensure that the air is saturated with moisture by covering them with glass. As roots are formed we gradually admit more air and

FIG. 109.—Vine eye.

FIG. 110.—Division of Roots (Primrose).

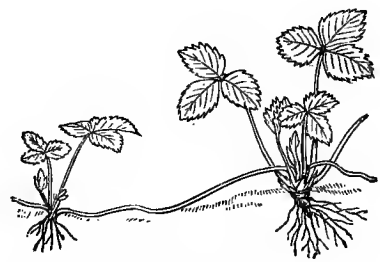


FIG. 111.—Runner (Strawberry).

more light. Loddiges recommended that the end of the shoot should be dipped in collodion; but I have found no advantage from the process.

We multiply some plants, as the polyanthus, phlox, and chrysanthemum, by division (fig. 110), and others, as the strawberry, by runners

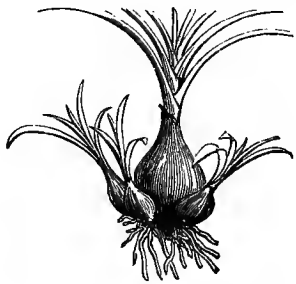


FIG. 112.—By Bulbs (Amaryllis).

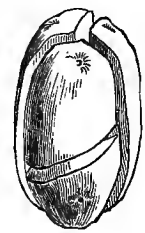


FIG. 113.—Potato.

(fig. 111). Some plants are multiplied by bulbs, as the hyacinth, amaryllis (fig. 112), shallot, garlic; and others by dividing the tuber, as the potato (fig. 113) and yam.

All the above cases are multiplications of an individual plant

with all its peculiarities. The multiplied hyacinth is white, blue, red, single or double, as was its parent; and the leaf, stem, root, flower, and fruit partake precisely of the same character as the original plant produced from seed, which thus may probably be propagated *ad infinitum*. Of late years it has been thought, by some good gardeners, that the parent plant becomes old and that it wears out; they cite the Ribston and Golden Pippins as an exemplification of their theory. This is not my opinion; and as, in all probability, the Jargonelle has been propagated from the time of the Romans in the past, so may it be continued till that indefinite time when the New Zealander in the future may be supposed to swallow up the English as the Americans now do the Indians.

FIG. 114.—Young Ferns growing from Fronds.

Some plants—as certain ferns, viz. many aspleniums (fig. 114), the *Cystopteris bulbifera*, the *Woodwardia radicans*—produce little bulbs or plants on their fronds, from which we readily propagate new plants.

Besides the above mode of reproducing the individual plant in its entirety, we have other methods of partially propagating a plant; that is to say, we may multiply the stems, the flower, and the fruit of a plant whilst we have roots of a totally different species. We may propagate the Jargonelle pear on the root of a common pear, or even on the root of a hawthorn or quince. This process is in fact the same as if a piece of skin of a black man were implanted in the body of a white man—which is quite possible. This mode of proceeding is almost invariably followed in propagating the individuality of fruits, and as an example the large majority of my pears have the roots of the quince. The manner in which we effect this mode of propagating is threefold,—by grafting, by inarching, and by budding. There is one secret in all these processes: this is, that the cambium of the graft or bud must come in contact with the cambium (or new layer of forming wood under the bark of the tree) to be worked. It is of

FIG. 115. Graft.

no avail if contact is made in any other way, as union only occurs when the two layers of new wood or cambium come in absolute contact.

Grafting (fig. 115) is almost invariably practised in the propagation of fruit-trees. In this case a shoot is cut from a tree desired to be multiplied before the leaves appear, and a slanting cut is made with a sharp knife. The tree to be grafted has a similar cut made in the reverse direction. The two cut surfaces are then brought directly together, so that both of the newly forming woody fibres come in contact, when they are retained in their position by a strip of bast mat. In England we then encircle the graft with a lump of clay (fig. 116). On the Continent grafting wax, composed of rosin, pitch, and tallow, is employed: occasionally the graft is protected by a strip of sheet india-rubber, which may eventually supersede the other methods. When we have a tree, the fruit of which is worthless, we put in two or three dozen grafts at once, and, in the space of two or three years, it becomes a bearing tree, giving a totally different produce (fig. 116). Practically every fruit-tree bought

FIG. 116.—Tree covered with Grafts.

FIG. 117 *a*. Saddle Graft.

FIG. 117 *b*. Cleft Graft.

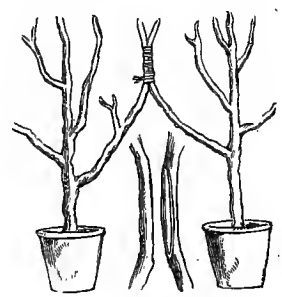


FIG. 118.—Inarching.

at a nursery has been grafted, so that the root and stem below the graft produces a different fruit from the head; and care must be taken that no shoot be allowed to grow below the graft, or we shall get fruit that we do not desire.

There are other methods of grafting which we do not often employ,

as they are only variations of mode and not of kind, such as saddle grafting (fig. 117*a*), where the graft is made to stride the stock; and cleft grafting (fig. 117*b*), where the graft is cut to a wedge, and let into a triangular hole cut in the stock. Occasionally we inarch trees. For this operation two trees are brought together. The stock has a slice cut off with a sharp knife, the other tree has a similar slice cut from a branch, when the two surfaces are brought into exact contact, care being taken that the two deposits of forming wood, or cambium, are brought accurately together (fig. 118).

There is still another plan that may be employed for many trees—as for pear-trees and rose-trees—and that is, a simple bud of one tree desired to be propagated is inserted into a second. In this case it is equally essential, as with grafting, that the two new layers of wood should be in exact contact. Budding we perform after Midsummer, as soon as the buds are perfected, and are full and plump, and when the bark separates easily from the stem. The stock has a T-shaped cut (fig. 119), made with a budding knife (fig. 61); into this the bud is inserted by turning back the bark in the angles of the T. The bud is kept in its position by a piece of bast, when a union speedily takes place, and the bud grows. The other parts of the tree are cut away, and we obtain a tree having the roots and stem of the parent plant, but with a head of the new variety we desire to propagate.

FIG. 119.—Budding.

Mr. Murray pointed out in an interesting paper read before the Horticultural Society, that whenever a graft is made, or a bud is inserted into a tree, the two cambiums alone unite; and that though the cut surface of the woody fibre is afterwards completely covered over by new wood, there is always a dead portion remaining in the interior of the tree, which never can be got rid of, but which always remains as a permanent defect (fig. 120). I have examined how the cells of one kind of tree, as the pear, are joined to those of another, as the quince. A thin section under the microscope exhibits an exact conjunction of

FIG. 120.—Chiswick, ½ size.

different cells, and this is never better shown than in the case of the mistletoe and apple, as the former lives on the latter as though it were grafted, and forms one continuous piece of wood (fig. 121).

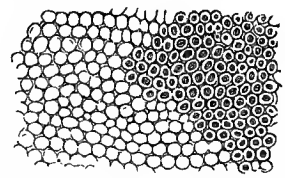


FIG. 121.—Mistletoe and Apple Cells.

We not only obtain the continuation of any particular plant by grafting, but in certain cases we influence its fertility. A pear grafted on a quince becomes fruitful years before it would on its own stock. An apple worked on Paradise stock has the fertility much improved in the young state. Rivers has sought to improve the fertility of the cherry-tree by working it on the mahebeb, and that of the filbert by working it on the *Corylus arborescens.*

We propagate our cryptogamic plants in three or four ways. First by spores which produce varieties within certain limits, like the higher plants, as is the case with the spores of the mushroom, which Mr. Smith for the first time has figured in the act of germinating (fig. 122). Any definite variety of fungus may be propagated by the

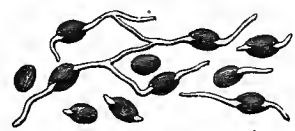


FIG. 122.—Mushroom Spores germinating.

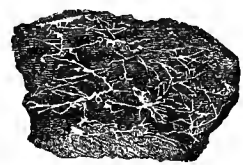
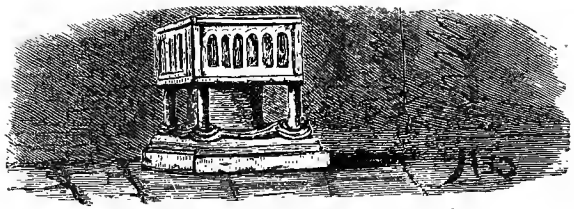


FIG. 123.—By Mycelium.

mycelium, whereby we secure perpetuation of the individuality of the original (fig. 123). In the case of ferns we constantly secure the multiplication by simple division. In the propagation of plants the seasons should be regarded, and as a rule the period of commencing growth is best adapted for the propagation of plants.

> "Nec tibi tam prudens quisquam persuadeat auctor,
> Tellurem Borea rigorem spirante moveri.
> Rura gelu tum claudit hiems ; nec semine jacto
> Concretam patitur radicem affigere terræ."—VIRGIL, *Georg.* ii.



Vign. XVI.—Old Font in Beddington Church.

CHAPTER VIII.

GARDEN VEGETALS.

"Mala copia quando
Ægrum solicitat stomachum ; cum rapula plenus
Atque acidas mavult inultas."—HORACE, *Satira* ii.

WITHOUT fresh vegetals the human body cannot be preserved in health ; and in long sea-voyages, for the want of lime-juice, lemon-juice, or fresh vegetals, scurvy was formerly more terrible than battle : as many sailors perished then from disease from want of fresh vegetals, as are now lost by sending rotten vessels to sea to obtain the money for which they are insured.

SALAD PLANTS.

A salad of some kind should be grown for every day in the year, and this requires attention and care, as the summer's fiery blast or the wintry chills may destroy the hopes of the gardener.

Of all salading plants the Water-cress (*Nasturtium officinale*) is the most valuable. It is in use all the year round ; it can be eaten with every meal, its flavour is unexceptionable, its digestibility satisfactory, it is warm and grateful to the stomach, and there are very few persons to whom it is distasteful. It requires, however, special care for its successful culture. It prefers the solid gravel bottom of a stream, with pure spring water from the depths of the earth to run over it. It may be planted at any time of the year by taking a

handful of the plants and retaining them under water by a large stone; the plant then speedily roots and spreads uniformly. About four to six inches of water suffices. Water-cresses like full exposure to light, and dislike the shade of trees.

Whilst growing, water-cress should be continually freed from other weeds, and duck-weed should be removed by a birch broom. When it runs to seed, it should be cut down. In the dark cold weather of November and December the plant is reduced to its smallest proportions.

Frost injures the plant; nevertheless by moderate care water-cresses may be procured for every day in the year. In severe frosts my gardener very judiciously covers the plant with water, and so protects it.

We note two varieties of water-cress, the green and the brown (fig. 124): the latter is preferred in the market, though I prefer the former, as being more delicate and hardier. By careful selection I once had a very brown stock; but if the green variety is not care-

FIG. 124.—Two forms of Water-cress.

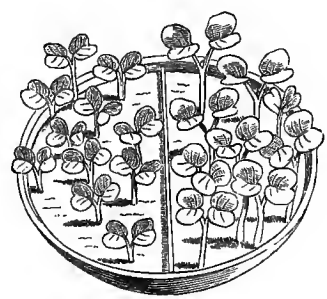


FIG. 125. FIG. 126.
Salads—Mustard and Rape.

fully destroyed, it speedily takes the place of the brown entirely. Water-cresses should be thoroughly cleansed before they are eaten, and should never be used where the stream has any sewage contamination. Water-cresses can be grown, although unsatisfactorily, in a moist place without water.

Germinating Mustard (*Sinapis alba*, fig. 125) can be procured all the year round by sowing the seed on a piece of wet flannel or on moistened earth. It is used whilst only the seed-leaves exist, and is a

warm condiment and a useful salading. For market purposes germinating Rape-seed (*Brassica Napus*, var. *oleifera*, fig. 126) is used in the same way, but it is so inferior to mustard that in private gardens it should never be employed. Rape-seed is, however, cheaper than mustard-seed, and hence it is employed for the market.

The Australian cress is a fine salad. It is used when the plant has five or six perfect leaves (fig. 127). It is particularly fine in early spring, when grown in an orchard-house. It is strongly to be commended, and it is not nearly so frequently grown as it ought to be.

FIG. 127.—Australian Cress.

FIG. 128.—Curled Cress.

The Curled Cress (*Lepidium sativum*, fig. 128) is also used for salad, and is likewise good in early spring, especially when grown in the orchard-house. We always grow a reasonable proportion. Where water-cresses cannot be obtained, the American Cress (*Barbarea præcox*) may be grown; otherwise it may be dispensed with altogether, as an inferior salad plant.

The Lettuce (*Lactuca sativa*) is a highly important salad plant. There are two general forms, the Cos and the Cabbage, with numerous varieties, one merging into the other. For the early crop in spring the Hammersmith Cabbage and Bath Cos are to be preferred. They are sown from the middle to the end of August, and the young plants are subsequently transplanted to a protected place, where they can get all the light of the winter's sun, and they are fit to cut in April and beginning of May. These, however, are hardly so good as the Paris Cos (fig. 129), which succeeds them, and which in my opinion is

the finest of all the lettuces. The seed of this variety is sown in November in a cold frame. When it has germinated, the lights are taken off every fine day. At the end of February a portion is planted out, and if severe frost kills them another portion takes their place.

It is so important to have good seed that we always save our own seed. I begged a little from a market gardener many years ago, who had begged it of another many years previously, and the finest lettuces have always been allowed to run to seed ever since: in this way we have secured a fine stock. For successive crops seed is sown again in January and February in the orchard-house, and these sowings are followed up by others, so that we obtain lettuces nearly till Christmas.

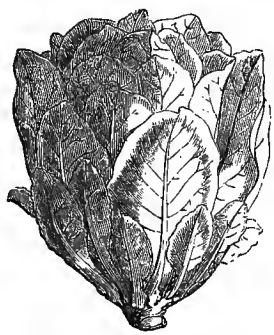


FIG. 129.—Selected Paris Cos Lettuce.

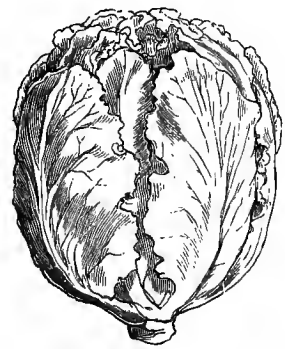


FIG. 130.—Neapolitan Cabbage Lettuce, ⅛ size.

In summer some persons like varieties of the cabbage lettuce, and I have figured one from Mr. Terry's garden, the Neapolitan Cabbage (fig. 130). There is also an enormous lettuce, called Dixon's Lettuce, which we sometimes grow, the leaves of which are tender and excellent.

Lettuces are praised by Horace as easily digestible :—

"Nam lactuca innatat acri
Post vinum stomacho."—HORACE, *Satira* iv. Book 2.

Lettuces should be grown in highly manured ground, and kept watered at Midsummer. If the underground aphis attacks the root, which it often does in August, the plant withers and dies.

All lettuces contain a principle allied to opium; for this reason lettuces should be blanched, when less of the soporific principle is produced. Gardeners handling lettuces all day become sleepy.

After the lettuce, and particularly for late autumn, winter, and early spring use, the Endive (*Cichorium Endivia*) is valuable. There are numerous varieties, but we generally restrict our cultivation to the narrow, green, curled (*C. E. crispa*), and broad Batavian varieties (*Cichorium Endivia latifolia*), of which I have figured the narrow-leaved variety (fig. 131). We sow the seed in July, and transplant the young plants into rich ground. After they have grown they are taken up with a ball and placed in one of our cold frames, where they are blanched for use. If not quite white, the plant is very bitter.

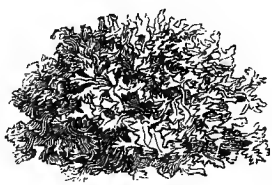


FIG. 131.—Curled Endive.

FIG. 132.—Chicory.

Allied to the endive we grow Chicory (*Cichorium Intybus*, fig. 132) for salad. It is sown from March to June, as we desire large or small roots. The roots are taken up in winter and planted in a warm cellar or other dark place, when the young leaves which sprout are used as salading. It is indispensable that the leaves should be thoroughly blanched, or they are so bitter as not to be fit for eating. The number of leaves which a few roots will produce is surprising, but chicory should rather be used to mix with other salad plants than employed by itself. The French use the leaves under the term of *Barbe du Capucin*, and it is sold in moderate quantites in Covent Garden market, but not nearly to the extent it deserves. Every London householder should, throughout the winter, have some roots; if they are kept in a dark cellar, either in a pot of sand or placed

horizontally in sand, the leaves will sprout and afford a salad whenever required. Horace thus speaks of chicory :—

"Me pascunt olivæ
Me cichorea, levesque malvæ."—*Ode* 31, Book 1.

We must admit that the English do not understand the good qualities of the Radish (*Raphanus sativus*). In France, go where you will, you are sure to find on the tables in the restaurants, during the summer and winter months, a glass of water containing young, delicious fresh radishes. Here, radishes are rarely seen except in spring, and then they are so large and coarse that they can only be eaten by any one with strong teeth and a vigorous digestion. We obtain our first radishes in early spring, by sowing the seed in the same frames as our early potatoes ; afterwards, we obtain a crop in the orchard-house. Following these, we get some out of doors, and in some years, by sowing a few every week and by a proper application of the water-pot, we have had radishes till the autumn. There are many varieties, some with long tap roots (fig. 133, B), some turnip-shaped (fig. 134), and others are olive-shaped (fig. 133, A) ; but the French breakfast radish is, to my taste, by far the finest of all the varieties. For private gardens it is well to begin with the early frame, then continue throughout the summer with the olive-shaped and French breakfast ; but a few seeds of the red and of the white turnip radishes may be sown for use in spring. There is a late variety called the Black Spanish, which comes into use in autumn ; and Mr. Robinson has lately introduced from California a radish as large as a small beet-root. Seed was sown in the Horticultural Gardens in August, and roots were shown before the Committee in December, when they proved to be tender and of excellent flavour.

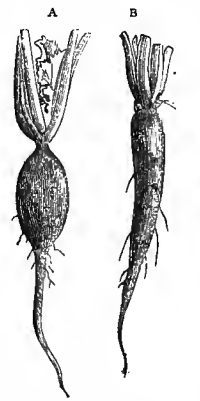


FIG. 133.—Radishes, ¼ diam.

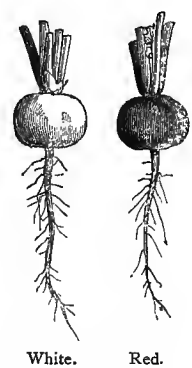


FIG. 134.—Turnip Radishes, ¼ diam.

In some gardens—especially when the. owner has lived in France—Burnet (*Poterium Sanguis orba*, fig. 135) is grown. It is a wild plant of our district; the leaves are used in salads, and give to them a peculiar cucumber-like flavour. We grow the plant, but I do not remember that we have ever made much use of it.

We have in our streams a plant called the Brooklime (*Veronica Beccabunga*), which is sometimes eaten by those who cannot get anything better. In Paris, large quantities of Corn Salad (*Valerianella olitoria*, fig. 136), or Lamb's-lettuce, are eaten. It is most disagreeable

FIG. 135.—Salad Burnet.

FIG. 136.—Corn Salad.

FIG. 137.—Oxalis.

to me, and is in my opinion utterly worthless; it should be exterminated from a garden as a useless weed. Some persons, however, never like a salad without it.

One of my pretty glen plants, the *Oxalis Acetosella*, or Shamrock (fig. 137), is said to make a delicate salad. Its flowers are so beautiful that it is one of the loveliest objects in spring. In some woods—as in the Arncliffe woods in Yorkshire—it covers the ground, but with me i is a delicate plant, from which we can only spare one or two leaves at a time, to taste the exquisite acidulous flavour which it possesses.

In France, Dandelion leaves (*Taraxacum Dens Leonis*) are much employed as a salad, though they are but rarely used by Englishmen. From the influx of foreigners during the siege of Paris, there was a sale for it in Covent Garden market. Dr. Hogg procured for the Horticultural Society some seed from plants which had been continuously selected for five years. Specimens of the plants, with leaves of large size and of mild flavour, were exhibited in 1871. Both Dr. Hogg and

myself thought highly of this attempt to improve a native and hardy plant; the Committee, however, as a whole, thought the matter unworthy of their approbation. But it deserves to be followed out, as it is possible to raise this weed from its wild condition and bitter flavour to the rank of a useful and culinary vegetable. Sometimes the leaves are used when blanched, but we have not yet adopted this plan.

FIG. 138.—Nasturtium.

In France the flowers of the Nasturtium (*Tropæolum*, fig. 138) are added to salad. They not only look pretty, but also impart a peculiar and agreeable flavour to the salad.

Celery (*Apium graveolens*, fig. 139) is an important salad plant, as it is in use from Michaelmas to May. It can be procured earlier; but the 1st of October is quite soon enough, considering how long it is in season. The seed is planted early in February, in seed-pans, in heat. As soon as the plant is sufficiently high, it should be pricked out in rich, highly manured soil, and then kept well watered and protected from cold. About Midsummer we remove these plants to trenches highly manured, and about every two weeks make successive plantings till the middle of August. After it has made sufficient growth, the earth is gradually piled up by several operations, in order to cover the stalks and thoroughly to blanch them. In cold weather the green tops should be covered with straw, so as to protect them from frost. A large quantity of celery ought always to be grown: it is a delicious vegetal when stewed; it is useful to give a flavour to soups; but its chief importance is its use as a salad during the winter months.

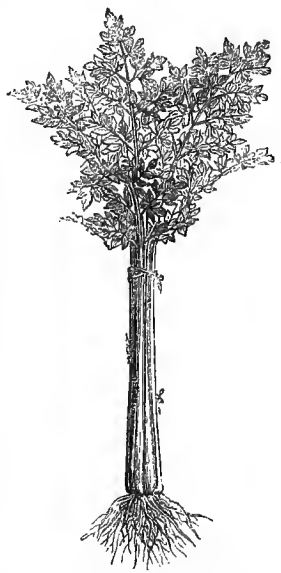


FIG. 139.—Ivery's Nonsuch Celery, $\frac{1}{6}$ size.

There are numerous gardeners' varieties—each differing in flavour, in

solidity of stem, and in tenderness. No kind is worth growing unless it is solid, as a pithy stem is very disagreeable. We grow chiefly a kind called Ivery's Nonsuch, but add one or two other kinds every year from the seedsmen's catalogues. There are one or two dwarf kinds of great excellence. There is a variety of celery with a bulbous root, called Celeriac (fig. 140), much used at Vienna and in other parts of the Continent, but little grown in this country. The seed is sown like that of celery, and planted out in rich ground. The bulbs are boiled, cut into slices, and served with oil and vinegar. It forms a very delicious salading for winter use. The bulbs which I have observed in the market-places abroad are much larger than those which have been produced in my garden; nevertheless some should invariably be grown. In Scotland, celeriac forms no bulbs, and has only fibrous roots.

FIG. 140.—Celeriac, $\frac{1}{8}$ diam.

In some years the growth of celery is difficult on account of the ravages of a leaf-eating grub (see Insects), which lives between the two skins of the leaf and which causes the plant to rot. The only remedy is to pick off the part of the leaf affected, taking care to remove as leaf as possible.

FIG. 141.—Cucumber, $\frac{1}{8}$ size.

Cucumbers (*Cucumis sativa*, fig. 141) form an article of salading which we have all the year round. Even in winter we obtain cucumbers when the sun vouchsafes to shine, but when it does not appear for weeks our plants go to grief. For winter use we plant in August, and prefer Rollison's Telegraph. It is a little difficult to get seeds of the true kind, and hence we frequently propagate by cuttings or layers, as a shoot six inches long, cut off at a joint and placed in cocoa-nut fibre, very freely roots, and soon makes a flowering and fruiting plant. In the same way a layer may be made of a larger shoot with perfect success.

About the beginning of May plants may be placed in cold frames with hot dung underneath, and they will give fruit all the summer. At the end of May certain kinds may be sown in highly manured ground out of doors, but they have never succeeded well in my garden. I have particularly observed this mode of cultivation at Sandy in Bedfordshire, where hundreds of tons of cucumbers are produced annually for market. Sandy is on the Greensand, which is a stratum subsequent to the chalk. The ground is highly manured, and patches of cucumbers are surrounded by seeding onions, which give a slight protection from the wind without producing any shade. In fine years the produce is almost fabulous. The kinds we prefer indoors, for flavour, are Sion House and the Telegraph, for both summer and winter use. We sometimes grow, in summer, Pearson's Long Gun; occasionally changing these kinds for other varieties.

Cucumbers, pumpkins, and vegetal marrows have the male (B) and female (A) flowers separate (fig. 142). It is indispensable to set melons,

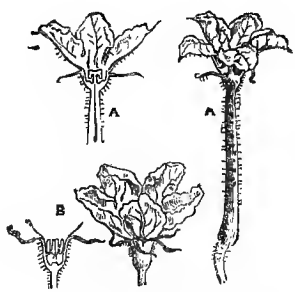


FIG. 142.—Cucumber.
A, Female Flower; B, Male Flower.

FIG. 143.—Cattell's Alliance Beet, $\frac{1}{6}$ diam.

it is advisable to set vegetal marrows; but it is reckoned preferable not to set cucumbers unless the seed is wanted for future growth. A cucumber should have no seeds in its interior, or it is pithy and not good to eat. Gardeners select varieties yielding but little seed, and hence it is not easy to procure seed of the best sorts.

A small kind of cucumber, called a gherkin, is used for pickling, but they do not grow readily. When we obtain a crop, they form a most excellent pickle.

Beet-root (*Beta vulgaris*, fig. 143) forms another invaluable winter salading. The root is independent of cold winters, as it is stored before frost can destroy it. It is baked or thoroughly boiled till it is tender, when it is sliced and served at table with vinegar and small pieces of shallot. We grow it in ample quantities for use between October and June, and for large families it is one of the most economical and useful of plants. The seed is sown in rows a foot apart in May. When the young plants are about four inches high, they are thinned to about ten inches or a foot apart in the row, and they require no further care than hoeing between the roots and keeping the plants free from weeds till the beginning of November, when they are stored in any convenient shed away from frost. There are many varieties. The sugar beet is moderately good, but it is large and white. Henderson's pine-apple is good. Nutting's is particularly well flavoured. Carter's variety is very deep coloured. Cattell's is also good.

As beet-roots approach the size and character of mangold-wurzels they are more earthy in flavour; hence the kinds which yield small roots are preferable. Beet-roots and mangold-wurzels of all kinds, when grated and mixed with flour, make very fair bread, which may be advantageously used in times of scarcity.

LEGUMINOUS PLANTS.

The luxury of a garden is in no respect more felt than in its production of leguminous plants, which can never be bought as fine or got so fresh as when grown in our own garden. The Pea (*Pisum sativum*) is a particularly fine vegetal, which may be procured in favourable seasons, and under proper culture, from the end of May till the beginning of November. We endeavour to have them as early as possible, but we do not always succeed, as early peas are more easily obtained in the sandy soil near Grays in Essex than in our soil and moister atmosphere. We seek to have them as fine as possible, in which we constantly succeed, and we like to have them as late as possible, in which we occasionally succeed.

The first crop is sown in November. The seeds germinate, and

the plants ought to stand the winter, as they will bear frost but not much damp. These give fruit in May, but I have known the whole crop to be cut off by a snow-storm when they have been in flower in the month of April. The first pea which is sown goes in the trade under many names, having little or no difference. Advertising seedsmen always have a pea to be fit ten days earlier than any other, but the 22nd of May is the earliest date at which peas ever come to the London market. Mr. Jackson of Grays, who has frequently sent the first peas to market, sows a selected stock of Daniel O'Rourke. In the second week

FIG. 144.—Dixon's Early Pea, ½ diam.

FIG. 145.—Champion of England Pea, ½ diam.

of November, we sow Dixon's First and Best (fig. 144), or Sutton's Ringleader for autumn planting. For sowing in February we obtain Daniel O'Rourke, which is better flavoured and rather more tender than the other varieties. All these sorts when they come to table are like little round bullets, with but little flavour. The ripe seed is round and smooth on the surface.

In February a really fine pea is sown—the Champion of England (fig. 145). This should be sown every two or three weeks in succession. It grows about five feet high in my soil, and if planted at the same time as Daniel O'Rourke comes into bearing two or three weeks later.

In the beginning of March the finest of all peas is sown, called Veitch's Perfection (fig. 146). The haulm is from three to four feet

high, and the pods are well filled with very large peas; but when boiled, nothing can be compared with them for tenderness and flavour. This variety comes in during the months of July and August. Two or three sowings at intervals of about three weeks should be made of this pea. In April another fine pea is sown to follow Veitch's Perfection, which is called Ne Plus Ultra (fig. 147). It grows six feet high and is an abundant bearer, the flavour, however, being second to that of Veitch's Perfection. By a succession of these we obtain peas till November, if birds do not forestall us, or if fungus does not attack the haulm.

FIG. 146.—Pea, Veitch's Perfection, ½ diam.

FIG. 147.—Ne Plus Ultra Pea, ½ diam.

The Champion of England, Veitch's Perfection, and Ne Plus Ultra are called marrow or wrinkled peas, because the ripe seed is wrinkled on the surface. Amongst the varieties of peas, the white wrinkled are esteemed as having a finer flavour than the green wrinkled peas.

It is a good plan every year to try one or two additional kinds selected from the seedsmen's catalogues according to the plausibility of the recommendation, but on no account do we omit to grow Daniel O'Rourke, Champion of England, Veitch's Perfection, and Ne

Plus Ultra. I must confess that the growth of these novelties is generally attended with more vexation than profit.

My gardener sows peas in trenches, like celery, which is certainly of great advantage in late peas, but is of doubtful benefit in earlier crops. We have tried to raise peas in pots and to transplant them in spring, but the experiment has always failed, as the peas so raised are tender, and perish with the slightest frost. The small early peas are sown more thickly than the larger or later ones, which may be sown two to three inches apart. Besides the above peas, there is a curious variety without the tough lining membrane of the shell, which is eaten when cooked shell and all, as French beans are. It is a mere curiosity, and unworthy of serious attention.

During winter we grow peas for their tops. A number are placed in a pot and allowed to germinate in a warm house. The tops are boiled, and used to flavour and colour soup. Peas are highly nutritious when they are easily digested. Their ash contains a large proportion of phosphates, and they require, therefore, rich soil, and one of sufficient porosity for their roots to penetrate deeply to moisture. Where a garden is of sufficient extent, it is desirable to plant a single row by itself, as that yields the most produce: otherwise, if planted in consecutive rows, there should be as great a distance between the rows as the haulm is high ;—that is, peas growing four feet high should be planted four feet apart, those six feet high should be planted six feet apart. Tall peas should be staked as soon as they are about four inches high, that the haulm may not be damaged before it clings to the stick. Every part of the pea plant is useful. That which man does not eat the horse and other animals will, and if peas are shelled near stables there is a commotion amongst the horses, as they can smell the delicious food, and will not be easy till they obtain it.

Every one who visits the Continent must be struck with the difference of flavour which the commonly cultivated foreign pea has, and how inferior it is to our better varieties. It is, however, preserved in enormous quantities in tin cases for winter use, and is

employed in the preparation of *entrées* and soups. It is worth consideration whether such an industry might not be profitably undertaken in those parts of this country where land and labour are moderate in price, and where our cultivated peas so far excel the Continental varieties.

Birds at times shell peas to a large extent. A visit of young jackdaws on a Sunday, when our garden is quiet, will clear a row of peas. The beautiful bullfinch is equally destructive. But the greatest enemy to the pea is the pea fungus, which will be described hereafter.

The Bean (*Faba vulgaris*, fig. 148) is a vegetal highly esteemed by some persons, but it is inferior to the pea, which it resembles in the amount of nitrogenous matter in its composition, and in the high proportion of phosphates which is contained in the ash. In Italy it appears to be used even to a greater extent than in England, although the dish of beans and bacon is never omitted from a feast in June in London. Horace enjoyed them nearly two thousand years ago—

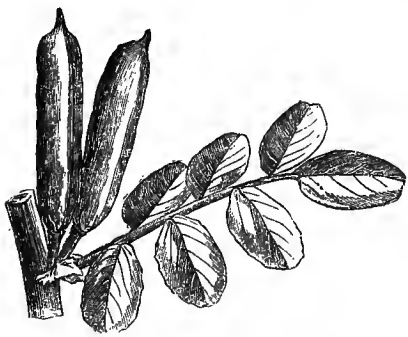


FIG. 148.—Early Mazagan Bean, ¼ diam.

> "O quando faba Pythagoræ cognata, simulque
> Uncta satis pingui ponentur oluscula lardo?"—*Satira* vi.

Beans are sown about three inches apart in drills about three inches deep, in the month of December, for the first crop of the next year. These bear in June, and by successive sowings in January, February, and March, the season may be maintained till autumn. We sow the Mazagan (fig. 148) in December, and the Long Pod or Green Long Pod in spring. There are many other varieties which we occasionally grow, but these are the principal ones in use at my garden. A bean, to my taste, should be quickly grown, and little larger than a marrow-fat pea to be in perfection, for if it be larger and harder there are not many persons who can readily digest them. Beans are sometimes

severely attacked by the Bean aphis, and also by some fungi. Herodotus states that "Beans are sown in no part of Egypt, neither will the inhabitants eat them, either boiled or raw; the priests will not even look at this pulse, esteeming it exceedingly unclean."

The Kidney-bean (*Phaseolus vulgaris*) is an important garden legume, of which we desire to prolong the crop as long as possible. There are very many varieties, some having white seeds, others seeds coloured; some being tall or running, others dwarf. The difference in the bean itself does not warrant much trouble being taken in

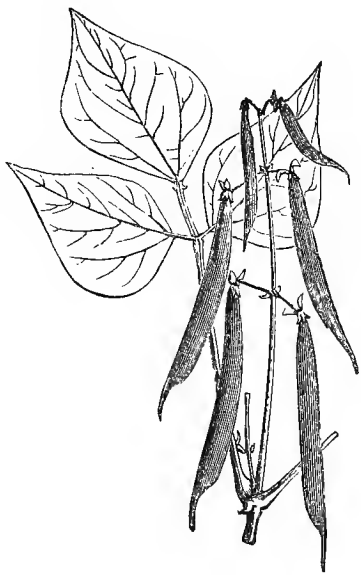


FIG. 149.—Negro Bean, ¼ size.

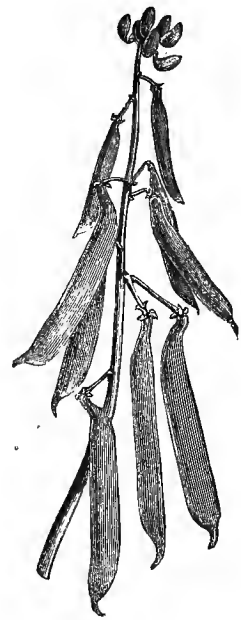


FIG. 150.—Scarlet Runner, ¼ size.

selecting the kind, and we may restrict our growth to two or three varieties. The Newington Wonder and Dwarf Negro are good coloured varieties; the latter especially forms fine regular symmetrical pods, and is chiefly cultivated for the London market (fig. 149). We sow our first crop out of doors the last week in April, and obtain produce in the middle of July, and we sow two or three successive crops. About the middle of July we make a final sowing in one of the cold frames, generally in one where a crop of melons has been

ripened. The plants are allowed to grow in the open air till the equinoctial gales occur, when the lights are used at night and during wet days. Later in the season the frames are matted at night, and in this way abundant produce is obtained till about the second week of November, when generally a frost occurs sufficiently severe to penetrate the frame, notwithstanding its covering, and to kill the plant. The length of time during which the plants last greatly depends upon the attention of the gardener.

The Kidney-bean grows in any good garden soil. The seeds should be planted in rows two feet apart, and the seeds about four inches from each other. Every bean should be gathered as it is fit; and as we use the pods in a green, immature state, the more we gather the more we get, for a ripened pod exhausts and consequently kills the plant. We sometimes have a few early forced beans from pits placed in the cucumber-house, and where there is a hothouse it is useful to have them in early spring.

Allied to the French bean, the Scarlet Runner (*Phaseolus multiflorus*, fig. 150) is a great favourite with the poor, who train it over their cottages. The scarlet runner is a perennial plant, though in this country I have never seen it live the winter, nor have I ever preserved the roots through the winter. There are several varieties, of which it is needless to take heed, as the common one suffices for all usual purposes. It is planted, like French beans, in April, and yields its produce in July, August, and September. The equinoctial gales have a hurtful effect upon it; but when it is protected from the violence of these gales, it will bear longer. Sometimes it is grown with us in rows upon sticks; sometimes it is grown over three poles arranged as a tripod, which allows more air and light. The latter is the preferable method, though I am bound to say that we generally employ the former. Market-gardeners usually do not employ sticks, but cut the runner back to about three feet of the ground. It is a good plan to make three sowings,—the first in the last week in April, the second in the third week of May, and the third in the middle of June. When we desire large and continued produce, it is of great consequence to

gather every single pod as it is fit for use. A very coarse variety has been lately introduced, which, however, is not to be commended.

SPINACEOUS VEGETALS.

Spinach (*Spinacia oleracea*) may be obtained nearly all the year, except in the hot month of August and in the beginning of September. There are two varieties; the round-seeded and prickly-seeded. The round-seeded (fig. 151) is sown between the rows of peas, and gives produce till the heat of summer causes it to run to flower, when it is pulled up and given to the animals. We sow our first crop in February, and repeat the sowing every month till June. The prickly-seeded is sown in the middle of August, and again in September, and these plants stand the winter.

FIG. 151.—Spinach, $\frac{1}{8}$ diam.

FIG. 152.—New Zealand Spinach, $\frac{1}{8}$ diam.

When common spinach cannot be procured, the New Zealand spinach (*Tetragonia expansa*, fig. 152) comes to our aid. It is a plant which was found by Captain Cook in the Pacific, and used by him to prevent scurvy. We sow a few seeds in a pan in a hot-bed in April, and plant out in May, when abundance of leaves are yielded in August and September. It is not so much used as it ought to be.

We have occasionally used in summer the Spinach Beet (fig. 153), which yields plenty of leaves and affords a good spinach in August and September. At the Trossachs Hotel, in Scotand, the gardener informed me that the spinach beet was the first vegetal to sprout in spring in that country, and, for that reason, he found it a valuable addition to the garden produce.

We grow also two varieties of Sorrel (*Rumex acetosa*, fig. 154), the narrow-leaved and the broad-leaved, which is much more esteemed in

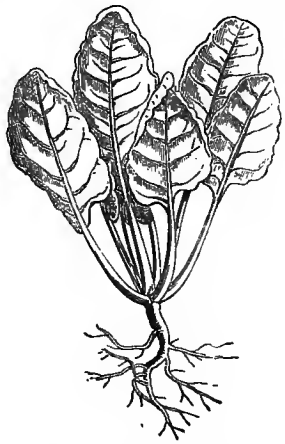


FIG. 153.—Silver Beet, $\frac{1}{16}$ diam.

FIG. 154.—Sorrel, $\frac{1}{8}$ diam.

France than in England. They are perennial plants of the Rhubarb race, and may be propagated by dividing the root. They may also be propagated by seed sown half an inch deep and the rows fifteen inches apart. Sorrel likes a rich, good soil.

THE CABBAGE TRIBE.

The Cabbage tribe (*Brassica oleracea capitata*) are important, as in one form or another they are in use all the year round. There are many varieties of the common cabbage. The largest is the Drumhead, chiefly used for cattle. The smallest is the Little Pixie or the Early York. Intermediate sizes are to be obtained in the Cocoa-nut (fig. 155), Enfield Market, Battersea, and Nonpareil. The red cabbage, although used chiefly for pickling, is a good culinary vegetal, and a partridge with red cabbage is no bad dish for an epicure. We usually sow in January, in the orchard-house, the seed of red cabbage and of one or two other kinds of cabbages. We sow again in March, and again in August, although the orchard-house-sown may take the place of the August-sown ones.

We grow also a collard which is extremely hardy, and which has been selected over a period of years; it is very difficult to seed, and

forms numerous heads by way of sprouts: this variety is found useful in early spring. Cabbages may be propagated by cuttings as well as by seed. The Savoy (*Brassica oleracea bullata major*, fig. 156) is a

FIG. 155.—Cabbage, ⅛ diam.

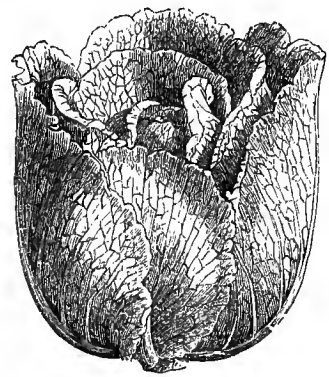


FIG. 156.—Savoy, ⅛ diam.

hardy form of vegetal, but coarser than the common cabbage. It should always be grown for winter use. We sow in March, plant out in July and August, and have them in use between November and February.

For winter use unquestionably, for a private garden, Brussels sprouts (*Brassica oleracea bullata gemmifera*, fig. 157) are of more value than any of the cabbage tribe. They are perfectly hardy, and withstand the severest cold; for this reason they should always be grown in quantity, as they last from the beginning of October till late in spring. The Brussels sprouts are so called because they throw up a stem about three feet high with leaves all the way up. In the axils of these leaves miniature savoys or sprouts are formed. It is curious that this vegetal does not remain true in many other places than at Brussels, although true seed may be obtained elsewhere. The produce is very large, for the little heads make up in quantity what they want in size. The head of the Brussels sprout is a poor cabbage-like development, which may be eaten, but is not so good as the little sprout.

The seed of our first crop is sown in the orchard-house in February. The main crop is sown at the end of March, in the open ground. The plants of the first sowing are planted out in May and June, as ground

can be spared, and plants of the second are planted in July. The plants may be placed in rows two feet asunder and a foot apart.

In Scotland it is usual to sow the seed of Brussels sprouts in August for a crop the succeeding year.

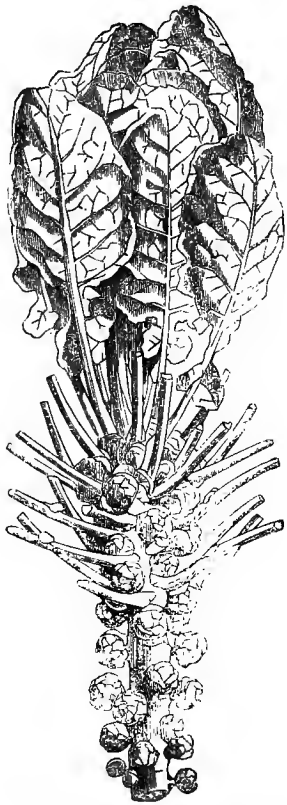


FIG. 157.—Brussels Sprouts, ⅛ diam.

FIG. 158.—Kohl Rabi, ⅛ diam.

FIG. 159.—Cauliflower, ⅛ diam.

Kohl Rabi (*Brassica Carlo Rapæ caudo*, fig. 158) is sometimes grown at my garden for the cattle. Occasionally we have cooked it by way of experiment, but it is, at best, an indifferent vegetal. The seed is sown in February and planted out in May, when by autumn the bulbs are fairly formed. It is particularly adapted for dry summers, as the hotter and drier the summer, the finer the bulbs.

We always grow a limited amount of Kale (*Brassica oleracea*).

It is very hardy, but inferior to Brussels sprouts. We have grown at various times many kinds: the Cottagers' kale, the Asparagus kale, and other varieties; but all are inferior to Brussels sprouts. There is one variety, the Variegated kale, which, if the seed can be bought from a good stock, is a most beautiful vegetal for garnishing in early spring, the leaves showing all the colours of the rainbow. We sow the seed in March, and plant out as soon as we can obtain ground in July, in rows two feet apart and eighteen inches from plant to plant. In Scotland, the cottagers pride themselves on the beauty of the leaf of their kale, which they obtain excessively curled.

We have generally Cauliflowers (*Brassica oleracea*) from June to Christmas, sometimes even later. Our early crop is sown in the third week of August. The young plants are transplanted in November to one of our cold pits, where they are kept more dry than moist, and are fully exposed to the air every fine day. In very severe winters many plants perish, but in very warm ones they grow too freely. The plants are transplanted out of doors in rich ground in February and March, and give produce in June. The second crop is sown in the orchard-house in January. A third crop is sown in the second week in March, and for late autumn and early winter use we sow again in the third week of May. In November all the plants are taken up, and placed in one of our cold frames to protect them from frost, when they give produce till Christmas or later. There are not many varieties of cauliflowers. For sowing in August we use the Early London (fig. 159); for the other sowings we generally grow the Walcheren. Near Naples they attain such prodigious dimensions that three constitute a comfortable load for a mule. With us, in favourable winters, young cauliflower plants will stand under a wall without protection; it is a common practice to winter them under hand lights, though we prefer the cold frame. Veitch's late cauliflower is a fine variety, which, if sown in August, comes in later than the Early London.

Broccoli (*Brassica oleracea*) is a good vegetal in April and May before cauliflowers come in, when a favourable season enables us to get it, but a crop cannot be relied upon in bad winters, and it

is inferior in texture, delicacy, and flavour to a well-grown cauliflower. In some winters not half-a-dozen plants survive. We plant the Cape varieties about the second week in April, and the spring kinds about the middle of May, and plant them out as we can spare room. The varieties of Broccoli are legion, and therefore I usually buy half-a-dozen kinds, in the hope that they may come in in succession, and that some may prove hardier than others. In both these respects we are frequently disappointed, as sometimes all come in together, at others all perish. It has been noticed that broccoli plants exposed to air and light in an open situation stand better than those planted in a sheltered garden. Chapell's cream-colour, Knight's protecting, and Snow's white are all good kinds which we always grow.

There is a variety of broccoli called sprouting broccoli, because little broccoli sprout from the axils of the leaves, like the little heads which form in a similar situation in Brussels sprouts. The seed is sown in the middle of May, and the produce is obtained in April and May following.

All the cabbage tribe like a well-manured soil. They are gross feeders, consequently putrid or coarse manures are to be avoided, as they are apt to be absorbed by the plant, and give—especially if the vegetal is not quite fresh—a most unpleasant flavour. Good stable manure only should be used for any of the cabbage tribe.

SEA-KALE, ASPARAGUS, ARTICHOKES, ETC.

Although Sea-kale (*Crambe maritima*) and Asparagus (*Asparagus officinalis*) are widely apart in their botanical characters, yet one takes the place of the other upon the table. Sea-kale is in use from the middle of December till about the middle of May, asparagus from the third week of April till the middle of July; however, I forbid my plants to be cut after the 1st of July.

Asparagus beds take much room. They should be made three feet wide, deeply trenched, and very heavily manured, when they will stand for many years. In each row sometimes three, sometimes four rows of plants are set, but I have not observed much difference in the produce. They should be two years old when planted in the bed. In winter, when

the stalk has perished, we give a good coat of stable manure, and cover with earth. In spring, about the middle of March, the earth is raked off into the alley. The first shoots appear (fig. 160) about the second week in April, but are then frequently frosted. The shoots continue to appear, and come again after the first are cut, till July, but too much cutting exhausts the bed. Asparagus is essentially the May vegetal, and enough should be grown to have daily produce till peas come in season. Foreigners fully appreciate asparagus, and in Italy wild asparagus is frequently on table; its flavour is so intensified as to be almost nauseous. In Paris enormous heads are brought to market from (I have been told) the South of France, but how it attains those immoderate proportions I am unaware, although I have made particular inquiries upon this point. Many persons salt their asparagus beds, but I have never done so to mine, and yet they yield good produce. Asparagus, as sold in the London market, is cut too young, because then it looks larger. In private gardens it should always be cut with so much green that a length of at least three inches without any stringy matter is entirely eatable. Sometimes, when I have been able to procure roots from an old bed, I have forced it in a frame over a gentle hot-bed, but it requires all the light possible to give flavour. Forced asparagus upon any scale is a luxury only adapted for state feasts. There is perhaps only one variety of asparagus; and it is very doubtful if the so-called giant varieties present any real differences.

FIG. 160. Asparagus ⅓ diam.

FIG. 161.—Sea kale, ⅛ size.

As Sea-kale (fig. 161) is in use over many months, it requires a proportionately large plantation. It is propagated by seed, or more commonly by little offsets from the larger plants. The first crop we obtain by taking up roots and placing them in a gentle hot-bed, care-

fully covered from the light, as this vegetal is disagreeable if not thoroughly blanched. Our later crops are obtained under sea-kale pots by covering them with leaves and hot dung, beginning with about two dozen pots at one end of the bed. As soon as the produce has been cut the pots are removed row by row beyond the former, and the leaves and hot dung turned over also to the new plants, by which a succession is secured. A sea-kale bed will last many years; and as it is one of our natural wild plants, it is perfectly hardy. I never saw it in use on the Continent, and foreigners at my table have often expressed great curiosity at the sight of this vegetal.

We have trouble with Artichokes (*Cynara Scolymus*), as they are apt to perish in winter in my garden. They should always be propagated by offsets, as when raised from seed many indifferent varieties are produced. The Globe Artichoke (fig. 162) is the best variety to cultivate. The flower is the part used for cookery, and should be employed young. In Italy they come to table all the spring, but probably they are brought from the extreme south.

FIG. 162.—Artichoke, ¼ size.

I have grown Cardoons (*Cynara cardunculus*), but never will again, as whether I have tasted them from my own garden, or whether I have obtained them abroad, they appear to be unworthy of cultivation. The blanched ribs of the leaves are eaten, but are infinitely inferior to stewed celery.

THE ALLIACEOUS PLANTS.

We grow four distinct crops of Onions (*Allium Cepa*). First of all we have the underground onions (fig. 163), which are planted in January, and yield their crop in June. A single tuber is planted, which gives four or five new tubers. They are useful for ships going abroad at that season of the year, but the tubers do not keep well, and this crop may be dispensed with. The second crop is raised by sowing seed from the middle to the end of August. The plants live

through the winter, afford young onions through the spring, and the remainder being either thinned or transplanted into rich soil produce

FIG. 163.—Underground Onions, ¼ diam.

FIG. 164.—Globe Tripoli Onion, ¼ diam.

by August fine bulbs. These onions attain much larger size if the soil between them is stirred, and small quantities of guano be given to them.

The best kinds for this purpose are the Flat and Globe Tripoli, the Rocca, and Spanish onions. We have grown the Globe Tripoli (fig. 164) nearly two pounds in weight, but at Naples they have attained nearly four pounds in weight. The third or main crop is sown in March, and when ripe is stored for winter use. The Spanish and blood-red are best for this crop. The fourth or last crop is cultivated to produce little tubers for pickling. Our soil is not well adapted to produce little onions, and we succeed but badly with them, probably from its being too damp. The cells of the skins of onions have crystals in them (fig. 165), which may be seen when examined under the microscope. We have occasionally had the tree onion, a variety which produces little onions at the tops of stalks. They are coarse and strong, and of no horticultural importance.

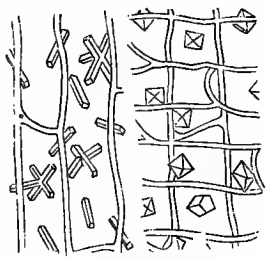


FIG. 165.—Crystals in Onion.

We always cultivate the Leek (*Allium Porrum*, fig. 166), which is a choice vegetal in early spring. It is the hardiest of all the hardy plants of the garden, standing the severest frost with impunity

Books tell us how to grow large leeks, but what is to be done with them when we have obtained them? Leeks for the table should be about an inch in diameter, and about six inches long: they are valuable in January, February, March, April, and beginning of May, when other fresh vegetals are scarce. We sow the seed broadcast in March, so as to have plenty of small leeks, rather than a few which are larger. The sorts which we employ are the London and Musselburgh, and they require no further trouble in their cultivation than hoeing and weeding after having been sown.

FIG. 166.—Leek.

FIG. 167.—Chives, ½ diam.

FIG. 168.—Shallots, ½ diam.

We have Chives (*Allium Schœnoprasum*, fig. 167) in the garden, to be used when onions fail; but as they never do fail, and as by the system we adopt young onions are obtainable all the spring, chives may be fairly dispensed with.

Shallots (*Allium ascalonicum*, fig. 168) are always carefully cultivated. They are planted in drills six inches from each other, and the rows a foot apart, at the same time in February as the potato onions are planted; they are ripe in July. Some are then taken up and stored for winter use. Some are pickled, and the rest are retained to be planted the next spring.

We grow a very limited amount of Garlic (*Allium sativum*, fig. 169).

The Romans considered it injurious: "Allium torquet, adurit, enecat." (Pliny, lib. xxv. cap. 13.) Our Continental neighbours use it to such an extent as to be offensive to the English, and enough to deter them for ever from using it in cookery. Garlic is grown like shallots or potato onions. A most extraordinary idea is mentioned by Horace, who speaks of garlic as a fit poison for anyone who has killed his father :—

FIG. 169.—Garlic.

> "Parentis olim si quis impia manu
> Senile guttar fregerit,
> Edat cicutis allium nocentius."—*Epode* 3.

MARROWS AND PUMPKINS.

Marrows (*Cucurbita ovifera*, fig. 170) are of great use in August, and when the hot weather dries up nearly every other vegetal it makes the vegetal marrow plants thrive and fruit. There are several varieties in cultivation; but one, the Custard, although very pretty in appearance, we have totally discarded, from its inferior quality at the table. The seed is sown in cold frames in April, and allowed to germinate slowly. At the end of May they may be planted out with a barrow of manure, when they will usefully cover any unsightly object. The more the marrows are cut the greater will be the produce, as a single fruit allowed to seed stops the produce of the plant. If at the end of the season a few are allowed to ripen, they will keep, and may be used through the winter.

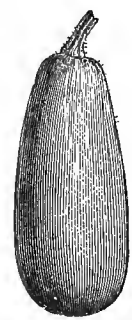


FIG. 170.—Vegetal Marrow, ⅛ diam.

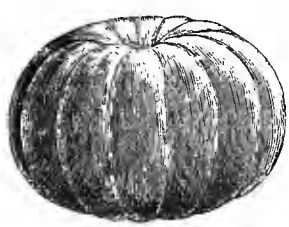


FIG. 171.—Pumpkin, $\frac{1}{16}$ diam.

We grow Pumpkins (*Cucurbita Pepo*, fig. 171) rather more for the pleasure of seeing them than for their intrinsic value. They are used in apple-pies; but the pies are better with apples alone, without the pumpkins. Pumpkin soup is extremely good, and can be particularly commended. Pumpkins are grown in the same manner as vegetal marrows. Neither our pumpkins nor vegetal marrows

were attacked with disease till 1871, when they were visited by aphides and fungi.

CULINARY ROOTS AND TUBERS.

We grow several crops of Turnips (*Brassica Rapa*, fig. 172). The first crop is sown early in March, and successional sowings are made till the middle of August. There are many varieties; we generally prefer the American Strap Leaf and the White Stone, though some prefer the Orange-jelly, which some again think objectionable on account of the yellow colour. Abroad, black-skinned turnips and long turnips are sold at every market-place. We sow the seed broadcast, and thin the young plants with the hoe. Turnips have many enemies. They are eaten up by the fly, they are destroyed by aphides and fungi, and they are also attacked by caterpillars. The turnip is a classical root praised by Horace, who says—

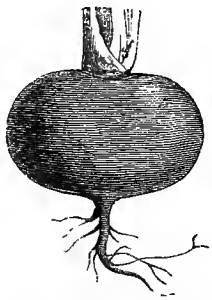


FIG 172.—Six Weeks' Turnip, ½ diam.

FIG. 173.—French Horn Carrot, ½ diam.

FIG. 174.—Student Parsnip, ⅛ size.

> "Acria circùm
> Rapula, lactucæ, radices, qualia lassum
> Pervellunt stomachum."—*Satira* viii.

Several crops of Carrots (*Daucus Carota*) are grown. The first crop is sown in a frame over a little hot dung in February, and comes in in May and June, and it is the most delicious of all. In March

a main crop is sown, and later other French Horn carrot seed to be used in winter. There is no carrot at all to equal the French Horn (fig. 173) in tenderness and flavour, when the seed can be procured true. The Altringham and the Long Surrey are stored for winter use, but whenever the French Horn can be procured, all the large and coarse sorts are better used for the horse than for the gentleman's table.

The Parsnip (*Pastinaca sativa*, fig. 174) is invaluable for winter and early spring use. In nutritive properties it is perhaps next to the potato amongst the ordinary culinary vegetals. We sow the seed in February in shallow drills about a foot apart, and thin the plants afterwards to twelve inches apart. The Student Selected Parsnip is a fine flavoured variety, which we generally grow together with the Hollow Crown. Parsnips are in the highest perfection in February and March.

Jerusalem Artichokes (*Helianthus tuberosus*, fig. 175) are more appreciated on the Continent than in England, where this very useful root is too much neglected. The Artichoke is a very hardy root, grows with very little trouble, and yields good produce. It is useful in spring as a vegetal, and makes besides capital soup. It is propagated from the tubers, and a fresh plantation should be made annually of the superfluous tubers. It flowers sometimes in this country, but does not seed. A friend of mine grew some acres of them, but could not sell them at market at all, so little are they used. Although Londoners discard them, they are a favourite food with pheasants, which show in this matter a more refined taste.

FIG. 175.—Jerusalem Artichoke, ½ diam.

I bought a number of the roots of the *Oxalis crenata* in Paris, where they are sold in the Palais Royal, but in my garden they did not form tubers.

The tuberous-rooted Chervil (*Chærophyllum sativum*, fig. 176) is also commonly sold in the Palais Royal. Up to this time I have not succeeded in its growth, as the roots have been too small for use. The plants grow six feet high, and are ornamental. This year mine have

freely seeded, and I hope to have better success. The seed should be sown in August, as soon as ripe. The roots boiled are an excellent vegetal.

FIG. 176.—Tuberous-rooted Chervil.

FIG. 177.—Salsify, $\frac{1}{8}$ diam.

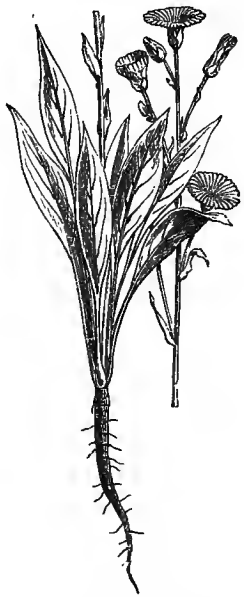


FIG. 178.—Scorzonera, $\frac{1}{8}$ diam.

Salsify (*Tragopogon porrifolius*, fig. 177) may be regarded as another fancy vegetal. The roots are boiled, and as cooked by our neighbours are excellent. The seed is sown in March, and, like parsnips, this vegetal is in use all the winter.

Scorzonera (*Scorzonera hispanica*, fig. 178) is used in the same way as salsify, and is of no more importance, but is nevertheless an excellent vegetal.

The Chinese Yam (*Batatas edulis*) is another vegetal which does not give sufficient produce with me; but probably if more attention had been paid to its cultivation it would have succeeded better. All the varieties of sweet potatoes of the West Indies will grow during the summer, but they form no tubers. The Chinese Yam is a trailing plant with a tuber which grows downwards. It is propagated by little bulbs formed in the axils of the leaves, or by division of the tuber: it requires very deep ground. The tubers are cooked like potatoes.

The Potato (*Solanum tuberosum*, fig. 179), in our social system, is really a field crop, from the vast areas cultivated and from the large quantity consumed. Nevertheless we give it a moderate place in the garden. We grow only two crops, and for both have used a variety known under the name of Rivers' Ash-leaf Kidney. Early in January we place a number of tubers in a shallow pan in the vinery, on earth, and let them sprout slowly; they are then planted in a layer of nine inches of garden mould, placed over about two feet of leaves and rotten dung to give a gentle and long-continued heat. These are fit for the table about the middle of May, and last till the end of June, a period at which a well-ripened new potato is a desideratum. For our second crop the tubers are started in the same manner, and placed out in rows two feet apart, and these come into use when the frame crop is finished. The earth is drawn up to the haulm when the plant is about six inches high, and that is all the cultivation which is required. The varieties of seedlings are now endless. By sowing the seed of a good kind another good kind out of a certain number may be fairly expected, and in selecting our kind we should be guided, firstly, by its having a small haulm, as it then occupies little room; secondly, by the solidity of the tuber; thirdly, by the weight of the tuber; fourthly, by its flavour, and the absence of a sweet taste fifthly, by its tuber being floury when cooked; sixthly, by the smoothness of its surface, and shallowness of the eyes, so that when peeled there is but little waste; and seventhly, by its productiveness.

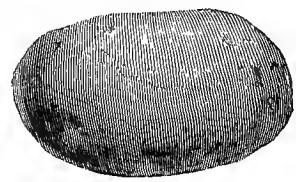


FIG. 179.—Royal Ash-leaf Potato, ½ size.

Of late years the potato has been subject to disease, when the haulm dies, the cells of the tuber lose their starch, and the cellular tissue breaks down (fig. 180). From my observations I believe the *Aphis vastator*, an aphis which has numerous synonyms, attacks the leaves; the plant is then attacked with a parasite fungus called the *Penispora infestans*, after which the plant dies and the tuber rots. Some good botanists consider that the fungus, and not the aphis, is the cause of the malady, and others believe that neither aphis nor fungus

has anything to do with the disease. I believe the aphis is the first aggressor, and that the fungus follows (see Fungi and Insects).

In foreign countries the curious fruit of the Egg plant (*Solanum esculentum*, fig. 181) is freely sold in the markets. In this country it is

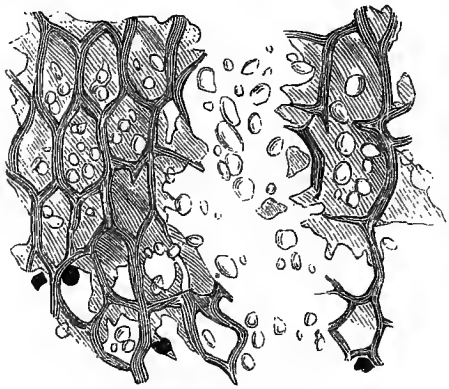


FIG. 180.

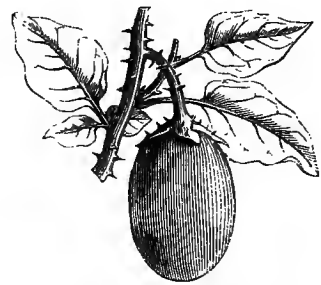


FIG. 181.—Solanum esculentum.

seldom if ever used. The white variety is a peculiarly interesting and curious plant, but the purple is more commonly employed as a vegetal.

HERBS AND AROMATIC PLANTS.

Several plants are grown for their aromatic properties, such as Mint (*Mentha*), which contains an essential oil. The common Mint (fig. 182) is propagated by division: it likes a loose soil. We never force it, but if required early it can be raised by placing a pot full of roots in a warm house. Its essential oil is used in medicine for flavouring.

We grow the Pennyroyal (fig. 183), but with us it is not a plant which is ever used.

We cultivate the Peppermint (*Mentha Piperita*, fig. 184) as a curiosity, but really have no use for it. Over our district it is grown in very large quantities for medicinal purposes. It is distilled about the middle of August, and the essential oil produced is the finest in the world, and is called oil of peppermint of Mitcham. When the distillation is being carried on, the air is full of the odour. It is replanted every year, a single shoot being dibbed in a hole, and many acres are cultivated with this plant. Honey made in our district has a distinct flavour

of peppermint. Its essential oil is useful as a warm cordial, and is used with other remedies in diarrhœa.

We generally have a plant of Balm (*Melissa officinalis*, fig. 185). It is occasionally used as balm tea, but is a plant of no importance whatever.

FIG. 182.—Mint.

FIG. 183.—Pennyroyal.

FIG. 184.—Peppermint.

Sage (*Salvia officinalis*, fig. 186) is used for cookery. There are two or three varieties, but the common sage suffices for all practical purposes. It is propagated either from seed or from cuttings, but it requires abundance of light, or it is apt to perish in winter. It does not stand so well in my garden as it does in many other apparently colder situations.

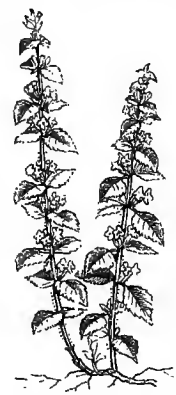


FIG. 185.—Balm.

FIG. 186.—Sage.

FIG. 187.—Thyme.

Thyme is another herb of universal cultivation. There is common thyme (*Thymus vulgaris*, fig. 187), which is propagated by seed, also Lemon thyme (*Thymus citriodorus*) and Orange thyme. Lemon thyme

is propagated by cuttings, and is the best variety. The crop should be cut in summer, and hung up to dry for winter use.

We grow Borage (*Borago officinalis*, fig. 188) for two reasons: first because it has a beautiful flower, and secondly because it imparts a

FIG. 188.—Borage.

FIG. 189.—Marigold.

pleasant flavour to claret-cup, which is a very desirable drink in the height of summer. It is propagated by seed, and when once in a garden comes up spontaneously every year.

Marigolds (*Calendula officinalis*, fig. 189) are employed in broths and soups, especially abroad, but I never saw them so used. The plant is only grown with us for its flower, but the flowers are said to be dried and sold as an article of commerce in Holland.

FIG. 190.—Angelica.

We do not grow either Aniseed (*Pimpinella Anisum*), Coriander-seed (*Coriandrum sativum*), or Caraway (*Carum Carui*). Angelica (*Archengelica officinalis*, fig. 190) is much used in a crystallized state for confectionery, and there are very few parties where it does not appear at table. The leaf-stalks are used in spring when young and tender. The plant grows freely, and is very handsome; but we never make use of it, as in fact only a skilled confectioner can preserve it. It is propagated by seed, which should be sown as soon as it is ripe, in August. It sows itself spontaneously.

In nearly every garden Feverfew (fig. 191) is grown. I have often heard that persons drink an infusion of the leaves, but I have no experience of its value, and probably it may be discarded altogether.

The Woodruff (*Asperula odorata*, fig. 192) is a sweet-scented wild plant which ought to be cultivated for the prettiness of its flower, for its hay-like odour, and for the flavour which it imparts to claret-cup. It grows well with me, but some time ago I nearly lost the whole, as a stupid labourer was carefully picking it all out as a useless

FIG. 191.—Feverfew.

FIG. 192.—Woodruff.

FIG. 193.—Samphire.

weed. This is really one of the greatest difficulties with which a cultivator of plants has to contend, as *employés* destroy the loveliest plants, and only preserve some florist's worthless monstrosity.

Samphire (*Crithmum maritimum*, fig. 193) is rarely grown in gardens, although it appears to thrive well at Wallington. When planted, some chalk was sunk in the ground and a little earth spread over, on which the plants grow. It grows wild at Folkestone and on the cliffs of Dover, where persons were formerly suspended by a rope to gather it from the cliffs. Its leaves are pickled to be mixed with salads, to impart to them its peculiar flavour.

> "Half way down
> Hangs one that gathers samphire—dreadful trade!"
>
> SHAKSPEARE, *King Lear.*

Our district is deservedly celebrated for its Lavender (*Lavendula spica*, fig. 194) fields, which are so beautiful when in flower as to be well worth the trouble of any lover of plants to visit from a considerable distance. The peculiar effect of myriads of heads of lavender in flower

can hardly be realized without being seen. The plant yields an essential oil, largely used in perfumery, and a considerable proportion of that which is made in England is obtained from plants grown in our locality. The flowers are gathered and distilled. The variety employed is propagated by division in spring. It yields some produce the first year, it is in its prime the second year, and is generally

FIG. 194.—Lavender.

FIG. 195.—Rosemary

FIG. 196.—Tobacco.

destroyed the third year, as it is apt to die in winter. It requires continual change of ground, but is reported to be a most profitable crop.

"Here's flowers for you:
Hot lavender, mints, savory, marjoram;
The marigold, that goes to bed with the sun,
And with him rises weeping: these are flowers
Of middle summer, and, I think, they are given
To men of middle age."—SHAKSPEARE, *Winter's Tale.*

We also grow a Rosemary (*Rosmarinus officinalis*, fig. 195) plant, which has a fine volatile oil, and is said to give the particular flavour to Narbonne honey, as the plants abound in that district, and the bees collect the honey from their flowers.

"There's rosemary: that's for remembrance."—SHAKSPEARE.

We grow a plant or two of Tobacco (*Nicotiana*, fig. 196), rather as a handsome ornamental plant than for any use.

In most years Basil (*Ocymum basilicum*, fig. 197) is grown in my garden. It is raised from seed in heat, and planted out. It is cut in

summer, and dried for winter use. It is particularly said to be the right herb to flavour turtle soup.

We grow both the Winter and Summer Savory. Winter Savory (*Satureia montana*) is a perennial, and is propagated by cuttings. Sum-

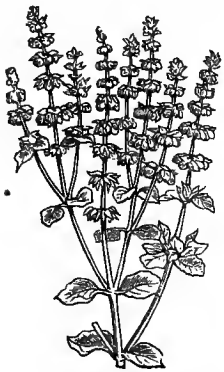


FIG. 197.—Sweet Basil.

FIG. 198.—Summer Savory.

FIG. 199.—Common Marjoram

mer Savory (*Satureia hortensis*, fig. 198) is sown in April. Both kinds may be used green, and should be cut and dried for winter use when the flower is about to expand.

Marjoram (*Origanum*, fig. 199) is another herb much used in cookery. It is propagated by division. Knotted Marjoram (*Origanum Majorana*, fig. 200) is in this country an annual, and requires the seed to be sown every spring.

We grow Tarragon (*Artemisia Dracunculus*, fig. 201), as the aromatic leaves are used to flavour soups, and also to make tarragon

FIG. 200.—Knotted Marjoram.

FIG. 201.—Tarragon.

FIG. 202.—Rue.

vinegar. It is a perennial plant, propagated by division. It does not stand well the cold of our winters, and therefore a new plantation should be made every spring.

There are various plants which are grown in nearly every garden, which are, nevertheless, of but little use. Rue (*Ruta graveolens*, fig. 202) is one of these. It is said to be an acro-narcotic poison in quantity, but is never used in medicine, and I do not know that any medical man has prescribed it with any good effect. It is easily propagated by cuttings. Shakspeare speaks of rue on several occasions:—

> "I'll set a bank of rue, sour herb of grace."
>
> "For you there's rosemary and rue: these keep
> Seeming and savour all the winter long."
>
> SHAKSPEARE, *Winter's Tale.*

Chamomile (*Anthemis nobilis*, fig. 203) is a plant which has been used for a long period. It is grown by the acre around us, and the flowers are gathered to be sold by the herbalists. It is a perennial, and we grow a plant or two. Pereira considers it to be a useful stomachic and tonic; he further states that flannel bags filled with the flowers and soaked in hot water are useful topical agents. It is doubtful whether the flowers add to the benefit of the hot water.

We have a plant of Hyssop (*Hyssopus officinalis*, fig. 204). It is said to be occasionally used in cookery, and sometimes in medicine;

FIG. 203.—Chamomile.

FIG. 204.—Hyssop.

FIG. 205.—Horehound.

but I believe that it is equally unimportant for either purpose. The plant may be propagated by division.

Horehound (*Marrubium vulgare*, fig. 205) is grown with us. It is a popular remedy for a cough, but is seldom or ever ordered by the doctor. It is sold in the shops in a candied state, and is used as a

domestic medicine by persons suffering from chronic pulmonary affections.

Parsley (*Petroselinum sativum*, fig. 206) is a plant of large consumption in a family. It was formerly used for garlands: "Apium igitur inter coronarias herbas memorandum est." A bed of considerable size is required. Probably its chief use is for garnishing, and then curled leaves are most appreciated. It is also used for cooking, when the single-leaved variety is preferred; but Thompson has pointed out that by using only the curled leaves all danger of mistaking the fool's parsley (a poisonous plant) for it may be avoided. The seed is sown in the end of February, and it runs to seed the following year. There are many fine varieties, but I have generally

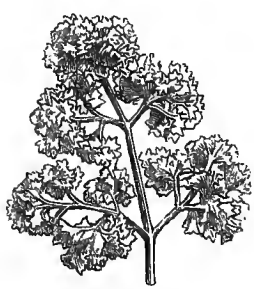


FIG. 206.—Parsley.

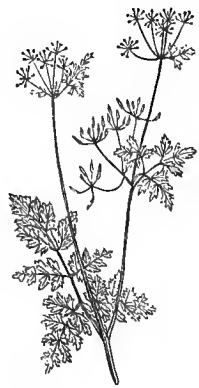


FIG. 207.—Chervil.

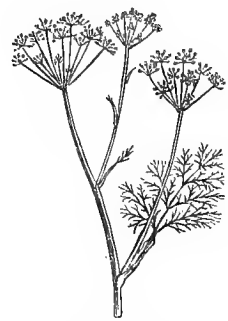


FIG. 208.—Fennel.

used Myatt's garnishing. In winter sometimes the demand is great and the supply very small, and therefore it is well to cover some plants for winter use with hand-lights. Parsley was mentioned also by Horace as used for garlands:—

"Est in horto,
Phylli, nectendis apium coronis."—HORACE, ii. 367.

Pliny says that it is considered that parsley prevents persons from becoming drunk, and that it confers a good odour upon the body:—"Apium; hoc arceri ebrietatem bonumque corpori odorem conferre aiunt." (Pliny, book xix. chap. 8.)

Chervil (*Anthriscus Cerefolium*, fig. 207) is another plant of the same nature as parsley. The leaves are valuable to add to salads, or to flavour soups. The seed does not keep well, and therefore should be sown as soon as ripe. It likes a moist, shady situation. With me it does not give much trouble, as it comes up annually in the same place. If not sown as the seed falls, it may be sown at the same time as parsley, and the seed should be but lightly covered with earth. Only a small patch is required.

Some persons like Fennel (*Anethum fœniculum*, fig. 208) sauce to be served with mackerel, but others think its flavour is very disagreeable. The seed is sown in March and covered lightly with earth, and the leaves only are used in cookery. A variety of fennel, growing near Naples (fig. 209), has noble leaves, and is very beautiful; it stands

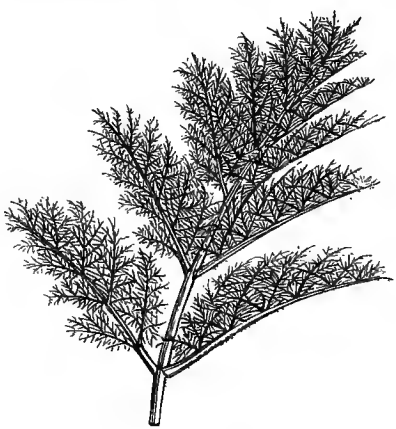


FIG. 209.—Barr's Fennel.

FIG. 210.—Chilis.

out in classical situations with great effect. It has a kind of bulbous root, which is blanched, and it is eaten like sea-kale or stewed celery. Although I have tried it several times at Naples, the fennel flavour was always disagreeable to me, and it is very inferior to our sea-kale. The figure is from a fine variety which Mr. Barr showed at the Horticultural Society, with leaves of the greatest beauty.

We grow several of the hot Chilis and Capsicums. The Chili *Capsicum annuum*, fig. 210) is especially valuable, as when we obtain a good crop we make our own Cayenne pepper by beating the dry chilis

in a pestle and mortar with a little salt. This is far superior to anything which can be obtained at the shops; and it should therefore always be grown in first-rate gardens. Chili vinegar is also made from them. The cherry capsicum is a very beautiful plant, and very useful to add to pickles. There is one fruit of this tribe of plants, the *Solanum anthropophagorum* (fig. 211), which is used by savages to promote the digestibility of human flesh.

I have often grown the Ginger plant (*Zingiber officinale*, fig. 212), but, as it is not a gaudy plant, somehow or other it is rarely kept till the second year. The root when dried is used for medicine and cookery, and when green is preserved with sugar. The stems are annual, and die down in autumn. For preserving, the roots are

FIG. 211.—Solanum anthropophagorum.

FIG. 212.—Ginger Plant.

FIG. 213.—Tomato, ½ diam.

preferable when not too woody or too strongly filled with the ginger principle: it has occurred to me, that it might be possible to grow it here, for that purpose, during the summer season. I have never tried it, but certainly shall on the first opportunity. In the fernery or cucumber-house it grows with the greatest facility, and puts forth an abundance of its creeping rhizomes, so that there would be no difficulty for any person to grow his own ginger.

We are particular about our Tomatoes (*Lycopersicum esculentum*, fig. 213), which we grow in cold frames. They should be raised from seed in February, and planted in the cold frames as soon as room can be spared. A three-light frame will yield a large produce of fruit, which is far superior in flavour to that imported from abroad, or to

that grown against walls in this country. There are many varieties, but I prefer, from trials which I have made, the large red sort. Tomato plants may be propagated by cuttings as well as from seed. The fruit ripens in August, September, and October, and makes excellent sauce for winter use. It is a capital vegetal when boiled, and a delicious salad when cut in slices, flavoured with shallot, and eaten with vinegar and pepper. Abroad it is used as a fruit, but it is not so employed in this country.

Horse-radish (*Cochlearia Armoracea*, fig. 214) is a condimental vegetal, the root of which, when scraped or made into sauce, is invariably used in England with roast beef. To grow it fine we require rich, deeply trenched ground. The crowns are planted about a foot below the surface, and they form the stalks which are used. The root of the *Aconitum Napellus* has been mistaken for it with fatal results, for this latter plant is most highly poisonous. I have figured it (fig. 215); but I strongly recommend it to be eradicated from ordinary gardens.

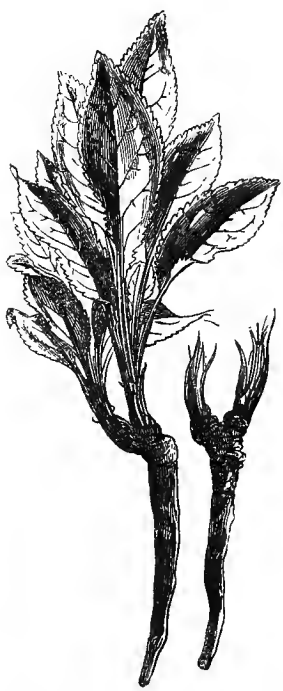


FIG. 214.—Horse-radish, ⅛ diam.

FIG. 215.—Aconite.

FIG. 216.—Absinthe.

Absinthe (*Artemisia absinthium*, fig. 216) is now much used by the

French. Dr. Gros, in a letter to myself, states that on the Boulevards of Paris, between four and six o'clock, glasses of absinthe are to be seen on every coffee-house table and at all wine-merchants'. The workpeople frequently take absinthe. They make what they call *les tournées*, each one wishing in his turn to treat his comrades. The middle class and the army drink it more frequently mixed with water, though the latter do not object to it pure, and the Parisian alcohol drinkers take absinthe as a rule. Physiological experiments show that in small doses absinthe causes giddiness, and epilepsy in larger. The mischief which is now being done by this plant is incalculable, and I grow the plant to point it out to my English friends, that they may never use so hurtful a drug in this country.

RHUBARB.

Within this century Rhubarb (*Rheum*, fig. 217) has been introduced as a substitute for fruit when it is scarce. It is a thoroughly English plant, and very few foreigners have ever seen or heard of it. It is in use from Christmas till May, when gooseberries come in, but it may be used later, and for preserving purposes it is better gathered in July and August. It is a delicious vegetal in a tart, but it owes its flavour to oxalic acid, which, although grateful to the palate, is not digestible. The acid exists in the plant as superoxalate of potash, and may be seen in the cells of the plant (fig. 218) by the aid of the microscope. The plant may be propagated by seed, but then either a good or a bad variety may be obtained. For this reason it is generally propagated by division of the root from some approved variety.

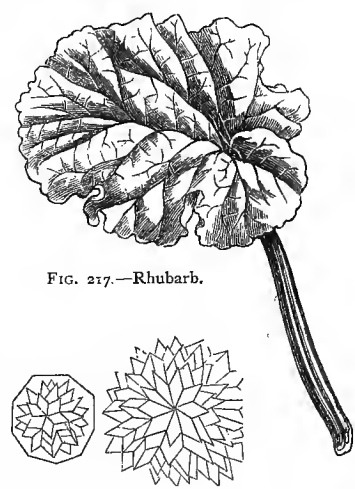


FIG. 217.—Rhubarb.

FIG. 218.—Raphides of Rhubarb.

The plant is grown for the stems of its leaves, and the first crop is

obtained by taking up one or two large roots about the third week in November, and placing them in the cucumber-house or cutting-house for use at Christmas. My gardener has forced it by placing a few roots in one of our warm springs and there covering them with a matting. The next crop is obtained by covering the crown with straw, and the last crop comes spontaneously in the open air. Rhubarb is much used in London for wine to be drunk as champagne at balls. It is, however, not wholesome, and frequently disagrees with the stomach. Persons should always be on their guard against rhubarb, and should not take it if experience shows that it disagrees. It is much more wholesome when young and forced, than when gathered in the open air later in the season, as the oxalic acid is then not so largely developed. We grow the Linnæus and the Victoria varieties.

Vign. XVII.—Scene on the Wandle.

Vign. XVIII.—Bridge over the Wandle.

CHAPTER IX.

MY FRUIT GARDEN.

"And many homely trees there were,
That peaches, coines, and apples bere,
Medlers, plummes, peeres, chesteinis,
Cherise, of whiche many one faine is."—CHAUCER.

WE are naturally led from the vegetal rhubarb, which under certain circumstances is so useful a substitute for fruit, to the consideration of our fruit garden itself.

Although in this country we do not practically grow to any large extent the oranges and lemons of the South of Europe, the delicious custard apple of Madeira, the date of Syria, the penetrating-flavoured vanilla of the West Indies, the lychia of China, or the banana of the Tropics; yet, taking England on the whole, there is no country in the world where the amount and variety of fine fruit are to be found in such perfection as we have them in the gentleman's garden of England,—with his greenhouses and ordinary horticultural appliances.

THE APPLE.

Of all our fruits, the Apple is perhaps the most useful, and is appreciated by birds and beasts as well as by man. My bullfinch loves his slice of apple, my horse thanks me by many little signs for the gift of an apple, and my cows delight to be offered one. The pigs, the chickens, the geese, all run to seize the windfalls as they drop, and sometimes the chickens get into the trees to procure the fruit.

There are numerous varieties of apples. There is scarcely such a thing as a totally bad apple unfit for any purpose. We grow in my garden more than three hundred varieties, a number far beyond what is required for ordinary purposes, and necessary only for experience and study. All these numerous kinds of apples are varieties of one species, the *Pyrus Malus*. They are in fact varieties confined within the limits of variation of one species. With all these numerous varieties, of which at least fifteen hundred have been catalogued, and perhaps many times that number remain unnamed, no new species have been formed. In some cases size has been developed, as in those of Lord Derby and Gloria Mundi; and in other instances ether is formed, as in the case of the Ribston Pippin or Nonpareil. There is also a variation in the colour of the skin, as in the skin of Lord Derby, which is green; or in that of the Scarlet Nonpareil, which is scarlet. Again, the texture varies, that of the Norfolk Biffin being very hard and solid, that of the Newtown Pippin being soft and delicate. Then there is a variety in the specific gravity of the juice, of which the extremest limit known in density reaches a specific gravity of 1091. Now it is worthy of note that although thousands upon thousands of seedlings from all these varieties have been under observation, yet all the varieties have been within a certain limit of variation, and never have attained to the rank of a new species.

Apples which are fine in texture and rich in flavour are selected for the purposes of the table, of which the Irish Peach, the Ribston Pippin, and the Golden Harvey are notable examples. Apples which under the action of heat form a soft pulp and have a rich flavour are chosen for culinary purposes, of which Cellini Pippin, Lord Suffield, Blenheim Orange, and Dumelow's Seedling are good examples.

There is yet a third class, which is used for cider, and which is selected for the high specific gravity of the expressed juice;—as the denser the juice the better the cider. Some of the worst and some of the choicest eating apples make fine cider; but it is the practice to mix many kinds together.

In France apples are peeled and dried, when they are exported to England under the name of Normandy pippins; these when soaked and cooked make a delicious dish for early spring, when fruit is scarce, and one which is far more wholesome than rhubarb, which is so much used in this country.

In Switzerland vast quantities of apples are grown; nevertheless the inhabitants are so frugal that they cut the sound portions from the windfalls in slices, and suspend them from a thread till they are dry, when they can be kept till winter; a practice which may well be imitated by our country people.

Varieties of apples are obtained by sowing pips of the best kinds. The pips are sown in drills, but they must be protected from the mice. Very few of the trees which grow from the seeds give apples positively bad and of no use, nevertheless not one in a thousand is superior to those varieties which have preceded them. It must be confessed that most of our fine apples have had an accidental origin, and have been discovered by observation. I have myself raised many seedlings, some of them of much promise, but certainly none up to this time superior to those in ordinary use.

When we have a tree of a variety which we appreciate, it may be multiplied by layering, when we obtain the same kind on its own root.

The same variety may be also propagated by grafting, when we obtain the same kind on a different stock.

> "The mother plant admires the leaves unknown
> Of alien trees, and apples not her own."—DRYDEN, *Georgics.*

Apples are grafted on the common seedling apple stock, or on the Paradise stock. The first stock I use for large trees and standards, the latter for small bushes. The immense superiority of the Paradise stock for small trees to ensure early bearing, may be learnt from an experiment which I made some years ago of two trees of the Juneating apple. One was grafted on the common stock, the other on the Paradise stock, and both were planted side by side. The one grafted on the Paradise stock has since that time yielded me annually

a crop: whilst the one grafted on the common stock, although a much larger tree, has not, up to the present time, yielded me a dozen apples altogether. There is an immeasurable difference between the produce of the Paradise and grafted seedling apple-trees during the early part of their existence, though for permanent plantations the apple-worked stock should be exclusively employed. My apple-trees worked on Paradise stocks are grown as hollow bowls, a form which is more congenial to the natural growth of the apple than the pyramidal form. My apple bowls are sometimes literally covered with fine fruit. Each apple gets an abundant supply of light and air, is finely coloured, and has good flavour. When, however, we allow a tree to overbear, it is crippled, and it will not bear again for one or two years till it has recovered. My hollow bowl apple-trees are slightly pruned in summer, and are cut as much as possible to one pattern in winter. In practice it is a bad plan to mix trees worked on Paradise stocks with trees worked on the common apple stock, as apples on the latter grow far more rapidly than those on the former: hence it is difficult, if not impossible, to have a plantation of the mixed trees of uniform size and shape. Sometimes there are kinds which grow too strongly on the Paradise stocks, yet upon the whole they can be grown tolerably uniform, and should always be employed in gardens. Occasionally I have had recourse to the practice of inarching (fig. 118), with perfect success, and then, as by grafting, a particular kind of apple is propagated on a stock of another variety. It is only required under very special circumstances, and may be entirely superseded by the process of grafting. The proper time for planting apple-trees is the interval between October and March. When the trees can be lifted and immediately replanted, the middle of October is a very good time. If the trees have to be sent from a distance, the middle or end of November is the best of all times; but if the roots have been cut in the month of October, any time between October and March will be satisfactory.

The pruning of apple-trees is simple. Standards need only have their cross boughs cut out; a Herefordshire magistrate, however, who

had large orchards, told me that the fruit was improved in quality by thinning the boughs to let the light and air to the branches. The hollow bowls on Paradise stocks require scarcely any pruning; but exuberant shoots should be plucked in midsummer and cut out in winter.

In some seasons,—and in some seasons only,—my apple-trees have been affected with a blasting of the leaves. The disease appears with a south-west wind, and especially when the winds blow strong and cold, as they often do when the leaves are young and tender in early summer. This disease especially attacks the Siberian Crab. We have found the best remedy is to lift the trees and give them some good top spit loam. An attack of this disease is damaging to the tree not only in the season of the attack, but also to the following crop. (See Fungi.)

Our apple-trees are growing in three forms. Some, as standards (fig. 219), have a straight stock six feet high, on which the desired

FIG. 219.—Standard Apple.

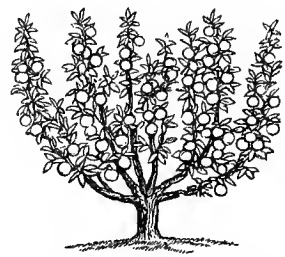


FIG. 220.—Hollow Bowl Apple-bush.

kind is grafted and spreads out with branches. Standards are generally grown in paddocks, and therefore ought to be so high that a horse or cow cannot reach the fruit. In our garden we generally grow them as bushes, or rather as hollow bowls (fig. 220). There is a third mode of training which is also useful in a garden,—the espalier (fig. 221), which occupies but little room. When air and light can act upon every branch, an espalier grows very fine fruit. Upon the whole, I greatly prefer the bush worked upon the Paradise stock wherever (as

in my garden) many trees are grown upon a small extent of ground. The French sometimes train a single stem close to the ground on a

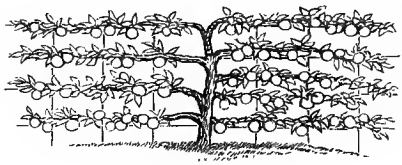


FIG. 221.—Apple Espalier.

FIG. 222.—Cordon Apple.

wire (fig. 222). I have tried the plan, but must regard it on the whole as an idle vanity, unworthy of scientific horticulture.

A few of my apples are grown in pots, such as the Newtown Pippin, the Northern Spy, and the Melon apples, which are from America. The Mala Cala, an Italian apple, requires pot culture; and there is a French apple called the Reinette Ananas, which, when cultivated in pots, is exceedingly beautiful. Its form, size, and transparent colour are so lovely that it resembles the plum rather than the apple. A little tree covered with its lovely fruit in the orchard-house is a most interesting sight.

Other apples grown in pots are the Empress Eugénie, fig. 223 (which seems to be a most beautiful and excellent kind, although I have hardly had sufficient experience to recommend it for general cultivation), Court-pendu, Duvesne, Perle d'Angleterre, Reinette Petite Grise, and Reinette de Madeira.

FIG. 223.—Empress Eugénie.[1]

We have generally forced the Early Juneating in a pot, and many times it has been shown as the first apple of the season, both at the Horticultural and Botanical Societies, at the end of May. The visitors have been amused and astonished, but the editors of the gardening newspapers have properly asked, "Cui bono?" To their inquiries I reply that it is an idle, useless vanity, but many vanities which pass for pleasures are more stupid. There is neither a secret nor a difficulty in obtaining "the first apples of the season." A tree of the White Juneating is potted

[1] All figures of apples are drawn one-third of their diameter.

in good top spit loam. The tree, when it has been in the pot for a year, is placed in a greenhouse in the middle of December. It then flowers in February, and its fruit ripens in May. To ensure success liquid manure should be given when the flower expands, again when the pips are forming, and lastly when the fruit is about to ripen. Simple as all this looks, I cannot every year get the first apples of the season, as much attention is required to ensure perfect success.

In autumn, the fruit should be gathered when the apples come readily from the tree; and, as a matter of experience, to prevent future shrivelling, apples should be left on the tree as late as they will hang without dropping. I have observed that apples which readily and prematurely drop, and which are usually called windfalls, are really imperfect themselves, and have no pips, except indeed those which, from the force of the wind, have been blown off with the adherent shoot. When the apples are gathered, they should be kept in the dark at a low temperature, with a slight current of air through the room. All the apples should be placed on shelves, as far apart as is convenient. If they are placed on straw, an unpleasant flavour is transmitted to the fruit; and if they are absolutely frozen, the texture of the fruit is destroyed. It is a good plan thoroughly to destroy fungus by sulphur fumes before apples are housed in any room for the winter, and then several kinds will last till new apples are produced. Fungus in apples imparts to them a most disagreeable taste, and of the two evils it is certainly better for them to shrivel than to remain plump and be full to the core with fungus growth. The one great test of a well-kept apple is an absence of fungus, and this is best secured by burning on a red-hot coal, once or twice a week in the apple-room, a piece of sulphur as big as a pea. This we always practise now.

It has already been stated that my collection of apples comprises nearly three hundred varieties. It is neither advisable nor expedient, however, to have so many kinds; but it is important to have both dessert and kitchen apples for every day in the year.

Every garden ought to have at least thirty kinds of dessert apples, so as to command a variety of flavour and a constant succession. The

early apples are only required to last a few days, and therefore a bush will suffice; the later apples are required to last over months, and for these large trees should be grown.

The first dessert apple which ripens in July is the White Juneating (fig. 224). It is small, but it is always welcomed as the first apple of the season. Following it quickly in succession is the Red Juneating or early Red Margaret, which has red stripes on the side exposed to the sun; it is delicious, but lasts only a few days. The Early Strawberry (fig. 225) follows this in turn, but it is always a small apple. Again, there is

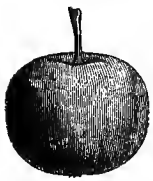


FIG. 224.—Juneating.

FIG. 225.—Early Strawberry Apple.

FIG. 226.—Irish Peach.

FIG. 227.—Reine Jaune Hâtive.

an apple ripening about the middle of August which is elegant in form, beautiful in colour, and excellent to the taste, the Irish Peach (fig. 226), which is the chief apple for a time, and gives way to one little known in this country, but which ought to be more cultivated,—Reine Jaune Hâtive (fig. 227). I have grown it in pots with great success,

FIG. 228.—Quarrenden Apple.

FIG. 229.—Kerry Pippin.

FIG. 230.—Benoni.

FIG. 231.—Gravenstein.

and am now cultivating it as a bush on the Paradise stock. About the same time comes in the Red Astrachan, and also the Devonshire Quarrenden (fig. 228). The latter is a great bearer, and its bright red colour on the side towards the sun makes it a great favourite as a market apple. At this season the Benoni (fig. 230) ripens; its odour is exceedingly fine and its appearance beautiful. It is an apple little known, but deserves general growth.

September comes, and brings with it the Kerry Pippin (fig. 230), which has a semi-transparent skin and a yellowish flesh, and also a fine flavour. The Kerry Pippin is succeeded by Gravenstein (fig. 231), which is another delicious apple for the season: towards the end of the month the Ribston Pippin, King of the Pippins, and Pitmaston Pineapple Pippin give us their delicious fruit. The Ribston (fig. 232) is one of the finest of all apples, and may be kept, if well ripened, till the following June: it has a peculiar flavour, due to an ether, which modern chemistry has been able to make in the laboratory. Every garden should have one or two large standard trees of this variety, as it is capricious in its bearing. The tree likes to grow in rich deep loam: I have tried it on its own roots, but this plan appears to have no advantage. The King of the Pippins (fig. 233) is a great bearer, though it is an inferior apple: nevertheless a garden should have

FIG. 232.—Ribston Pippin.

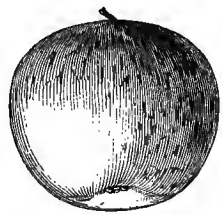


FIG. 233.—King of the Pippins.

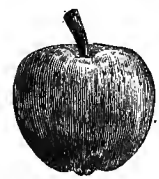


FIG. 233*a*.—Pitmaston Pineapple.

FIG. 234.—Cornish Gilliflower.

one tree of this variety. The Pitmaston Pineapple (fig. 233*a*) is little known, but I have found it second to none in cultivation. It is not too large, is very sugary and highly flavoured, and is one of the best of all apples. With me it frequently bears prodigiously; but, when it does so, I obtain no crop the next year. No garden should be without this apple.

From the middle of October till the middle of November the Ribston alone should be used. December gives us the Cornish Gilliflower, one of the finest of all apples (fig. 234). It has a yellowish flesh, and its flavour is most delicious; but the tree is so indifferent a bearer near London, that we can never depend upon a crop, although I have at least half-a-dozen trees. The mode of growth of this tree is peculiar, as it throws out long slim branches, and frequently it

bears at the ends of the branches. It does not bear pruning, and ought to be allowed to grow freely. Then the Melon apple (fig.

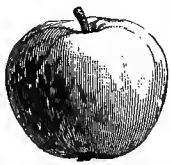


FIG. 235.—Melon Apple.

FIG. 236.—Cox's Orange Pippin.

FIG. 237.—Golden Pippin.

FIG. 238.—Court of Wick.

235) comes into use, a fruit of delicate texture from America, together with Cox's Orange Pippin (fig. 236), an apple of the highest quality, which should be grown in quantity, and the little Golden Pippin (fig. 237) of ancient celebrity. Horticulturists speak of this apple as a fruit of the past, but in my garden it fruits freely on small

FIG. 239.—Coe's Golden Drop.

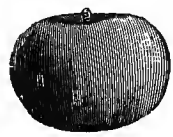


FIG. 240.—Court-pendu Plat.

FIG. 241.—Mannington's Pearmain.

FIG. 242.—Northern Spy.

trees worked on the Paradise stock. The latter part of December adds to our list the Court of Wick Pippin (fig. 238), Coe's Golden Drop (fig. 239), and Court-pendu Plat (fig. 240),—all valuable for their property of keeping till spring.

About this time we have Mannington's Pearmain (fig. 241), which is a very fine apple; and the Northern Spy (fig. 242), which has the

FIG. 243.—American Newtown Pippin.

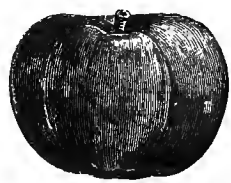


FIG. 244.—Reinette of Canada.

FIG. 245.—Golden Harvey.

FIG. 246.—Early Nonpareil.

delicate texture of other American apples. This apple attains to great perfection and beauty in the orchard-house.

The Newtown Pippin (fig. 243) has not done well with me. When grown in America the fruit has an incomparable etherial flavour, which it never obtains in this climate. This apple is remarkable for having black spots in the skin.

January produces the large Reinette du Canada (fig. 244), which is generally a good bearer, and gives a large fine apple with excellent flavour. The Golden Harvey (fig. 245),—a small apple,—ripens about

FIG. 247. Old Nonpareil.

FIG. 248. Braddiek's Nonpareil.

FIG. 249.—Screveton's Golden Pippin.

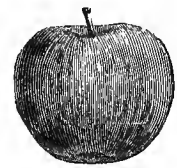


FIG. 250.—Adams' Pearmain.

this time. The various Nonpareils, such as the Early Nonpareil (fig. 246), which is a good bearer, are now fit for use. The Old Nonpareil (fig. 247) is a very fine apple, below medium size, and Braddick's Nonpareil (fig. 248) is also an apple of high excellence. The Scarlet Nonpareil is another apple of great beauty and of high quality, which should always be grown.

Screveton's Golden Pippin (fig. 249) is a capital little apple for spring use. Adams' Pearmain (fig. 250) is another fine apple, well deserving of cultivation, and the Boston Russet (fig. 251) is a late apple of high excellence.

We also grow, on bush trees, the Reinette Ananas (fig. 252), for its extreme beauty of form and transparent skin, which renders it an

FIG. 251.—Boston Russet.

FIG. 252.—Reinette Ananas.

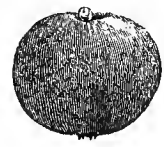


FIG. 253.—Duke of Devonshire.

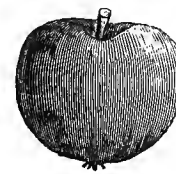


FIG. 254.—Stunner Pippin.

ornament to the dinner-table. They are not so beautiful when grown out of doors as when grown in pots in the orchard-house.

In February and March we have, besides, the Duke of Devonshire (fig. 253), a new apple, hardly as yet come into extensive cultivation, but one which is manifestly an important late apple of high flavour.

In April and May good apples are scarce, nevertheless the Sturmer Pippin (fig. 254) is still in great perfection; it keeps perfectly till June, and is a thoroughly good apple. Lastly, that too generally forgotten but admirable apple, Ord's apple (fig. 255), carries on our dessert fruit till strawberries appear. Mr. Thompson highly commended this apple; Mr. Barron recommends it, and yet it is rarely to be obtained at any nursery-ground. I have ordered it several times, and have had an apple-tree of another kind sent to me (an unpardonable offence, always to be severely censured). The Horticultural Society can supply grafts, and Mr. Lee of Hammersmith has trees for disposal. It is very desirable to promote an extensive cultivation of this variety, which, however, has the demerit of possessing neither beauty of form nor brightness of colour to recommend it.

FIG. 255.—Ord's Apple.

Out of my extensive collection, I cannot recommend more than the above for universal cultivation; but no garden should be without all or the greater part of those which I have described.

The apples which should be cultivated in quantities are the Devonshire Quarrenden, Ribston Pippin, Pitmaston Pineapple, Cox's Orange Pippin, Braddick's Nonpareil, Old Nonpareil, Pearson's Plate, Reinette du Canada, and Ord's Apple.

All the apples, from the Ribston Pippin downwards, may be kept with care till June, and therefore I have recorded the period of ripening somewhat in the order in which the above-described kinds have been fit for use with us; but the time over which they may be made to last will depend upon the care taken in their conservation, as I have tasted most of the kinds, from the Ribston downwards, in the month of May, and sometimes even in June.

Other dessert apples which are cultivated in my garden are the Astrachan, which is a handsome, good apple, ripening in August; Ash-

mead's Kernel, a fine Gloucester apple, which ripens in November; Bess Pool; Cockle Pippin, a handsome apple, and a favourite with some persons; Early Harvest, Summer Golden Pippin, and Early Julien,—all ripening in August, but not required with those I have recommended; Forfar Pippin, ripening in March, Hughes' Golden Pippin, Franklin's Golden Pippin, Pitmaston's Golden Pippin, Small's Golden Pippin,—all late keepers; Keddleston Pippin, highly commended; Margil, a good apple; Pitmaston Russet Nonpareil, Claygate, Baxter's, Grange's, Hubbard's, Herefordshire, and Lamb Abbey Pearmains,—none of them presenting any very remarkable features; Prince Albert and Victoria,—neither found as good as reputed; Reinette Van Mons, upon which a decided opinion has not as yet been formed; Spring Ribston, Pineapple Russet and Sykehouse Russet, Sam Young, St. Sauveur and Golden Knob, Wyken Pippin and Webb's Russet,—all of which have more or less merit. Williams' Favourite appears to be a fine apple. The Russian apples Cardinal, Duke Constantine, Count Orloff, and Holcar Pippin have not yet borne fruit. The American apples the Mother Apple and McClellan are interesting, but these American apples, as already mentioned in the case of the Newtown Pippin, when grown in this country are destitute of that high etherial flavour which they attain in their native habitats. We also grow Allen's Everlasting and Ulmer's Golden Reinette, both of which are very late apples and keep well. We have also many other kinds, which I have not thought it necessary to describe.

My experience shows that it is not necessary to grow any large number of varieties of kitchen apples, though, as they are in request for at least nine months out of the twelve, an abundance of fruit should be stored for winter use.

The following list will probably suffice:—

Keswick Codlin.	New Hawthornden.	Stirling Castle.
Lord Suffield.	Lord Derby.	Gooseberry Pippin.
Alexander.	Warner's King.	Wellington.
Cellini Pippin.	Blenheim Orange.	French Crab.
Hawthornden.	Gloria Mundi.	Siberian Crab.

The Keswick Codlin (fig. 256) gives, when boiled or baked, a delicious pulp, which has a flavour peculiar to itself and most agreeable. It is one of our early cooking apples, and is immediately succeeded by Lord Suffield (fig. 257), which attains a large size and is valuable

FIG. 256.—Keswick Codlin.

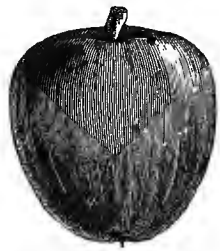


FIG. 257.—Lord Suffield.

FIG. 258.—Emperor Alexander

for baking; it is also an abundant bearer, and no garden can possibly dispense with it; it lasts till the end of November. Following this, the Alexander or Emperor Alexander (fig. 258) is a handsome apple, which does not, however, bear well in my garden.

FIG. 259.—Cellini Pippin.

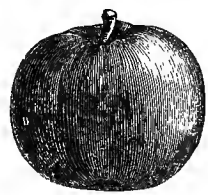


FIG. 260.
Hawthornden, No. 1.

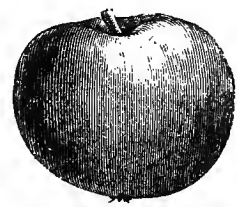


FIG. 261.—New Hawthornden, No. 2.

The Cellini Pippin (fig. 259) is acid, and makes excellent apple sauce. A peculiarity of this valuable fruit is that, in addition to the fruitfulness of the trees, the apples are really good when cooked, although only three-parts grown, and thus an overladen tree may be thinned without any loss of fruit. When the tree is laden with its brightly streaked fruit, it is perfectly beautiful. The Hawthornden (fig. 260) is also a great bearer and a good cooking apple, but the fruit does not keep long. This is followed by the New Hawthornden (fig. 261), also a good apple. Lord Derby (fig. 262) is an apple which attains great perfection in my garden.

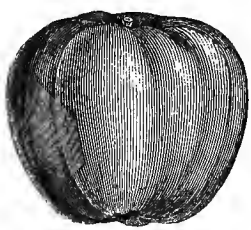


FIG. 262.—Lord Derby.

It was raised by Whitham of Mr. Reddish in Yorkshire, and it has generally commanded the first prize for size. In its dark green colour and form it differs from most other apples. Warner's King (fig. 263) is another fine large apple, differing much in form from the

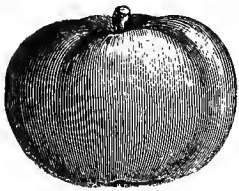


FIG. 263.—Warner's King.

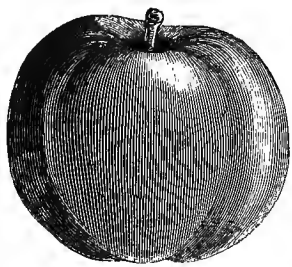


FIG. 264.—Gloria Mundi.

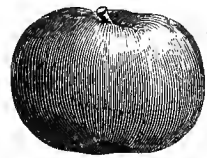


FIG. 265.—Stirling Castle.

others described. Gloria Mundi (fig. 264) is another apple of enormous dimensions, measuring sometimes as much as fourteen inches round. The Stirling Castle (fig. 265) is reputed to be a fine apple: I have only lately had a tree, and so cannot speak decidedly of its merits.

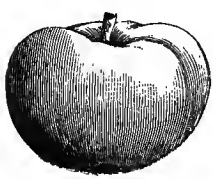


FIG. 266.—Winter Peach.

FIG. 267.—Blenheim Orange.

FIG. 268.—Gooseberry.

The Winter Peach (fig. 266) is a valuable late keeping apple. For winter use there is no better apple than the Blenheim Orange (fig. 267). It is so good that it is considered by many persons to be a dessert fruit. Two or three trees may be beneficially grown of this kind. For late spring use the Gooseberry Pippin (fig. 268) is recommended; it is valuable from its acidity and from its keeping qualities. Perhaps, however, the best of the late apples is the Wellington (fig. 269), which keeps fairly till summer, and more than one tree should be cultivated of this kind.

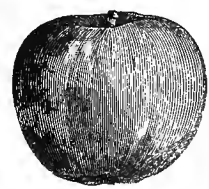


FIG. 269.—Wellington.

The Winter Greening will keep till the second year; and the French Crab (fig. 270), which we also cultivate, keeps for two years.

FIG. 270.—French Crab.

It is indeed a glorious sight to look at our apple bushes in full flower in the month of May; but as the performance is to the promise, so is the display of the fruit in autumn to the blossom of spring.

> "And them amongst, some were of burnish'd Gold,
> So made by Art, to beautify the rest,
> Which did themselves amongst the Leaves enfold,
> As lurking from the view of covetous Guest,
> That the weak Boughs, with so rich load oppress'd,
> Did bow adown, as over-burden'd."—SPENSER, *Fairy Queen.*

Besides apple-trees, the Siberian Crab (*Pyrus prunifolia*, fig. 271) is a tree of surpassing beauty, first when in blossom in the spring, and a second time when in fruit in the late summer. It is so great an ornament in the garden that I have at least a dozen trees, and, in favourable seasons, the produce is large, which I distribute amongst my friends; telling them not to despise so small an apple, but to be thankful for the gift, which they ought to preserve for winter use as one of their most delicious conserves. The Scarlet Crab is even more handsome, but it is not so well flavoured. The American Crab is larger and not so beautiful, but good for apple jelly. Both of these latter should be grown in shrubberies, where fruitless trees would otherwise take their place.

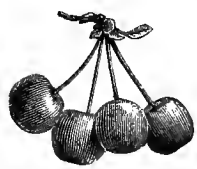


FIG. 271.—Siberian Crab

> "Tall thriving trees confess'd the fruitful mold,
> The redd'ning apple ripens here to gold."—POPE'S *Od.*

Cider apples are not grown with us, and the cider which is used is procured from Stephens of Gloucester, who has favoured me with the particulars of its manufacture on a large scale. It is supposed that apples yielding the densest juice make the finest cider, and

Thompson gives the specific gravity of the juices of various apples, of which the following afford the highest; I have not tried the experiment myself:—

Siberian Harvey	1,091	Fox Whelp	1,076
Siberian Bitter-Sweet . .	1,091	Downton Pippin	1,080
Golden Harvey	1,085	Golden Pippin	1,078

Mr. Stephens states that practically they do not manufacture cider of one variety of apple, but that at the proper season the crop is shaken from the trees, and not gathered. The apples are piled in heaps in the open yard until ripe, and when ripe are carefully picked over for the finest cider, and the rotten ones put aside. They are then put through a mill, which is a kind of grater. The pulp and juice run into a large slate tank, whence the pulp is transferred into hair bags under a press, when the liquid is again received by a slate tank. Thence it is transferred to a tub, holding about 1,000 gallons, where it ferments. It is then strained through filtering bags, and kept in casks. If not bright it is fined with isinglass. It is racked from one cask to another to stop fermentation, and finally is bottled in March and April. In the best cider no sugar whatever is used; in the cheaper some is added. In Devonshire sulphur is used to stop fermentation, but Mr. Stephens has not employed it. Probably, however, the judicious use of sulphur, as in the wine countries, would do much to improve the quality of cider by restraining the fermentation. Bottled cider should be kept upright and in a cool place.

> "The fragrant stores, the wide-projected heaps
> Of apples, which the lusty-handed year,
> Innumerous, o'er the blushing orchard shakes.
> A various spirit, fresh, delicious, keen,
> Dwells in the gelid pores; and, active, points
> The piercing cider for the thirsty tongue."
>
> THOMSON'S *Seasons.*

THE MEDLAR.

"You'll be rotten ere you be half ripe, and that's the right virtue of the medlar."
SHAKSPEARE, *King Henry V.*

Medlars are very ornamental trees. They have grand striking flowers in spring. Their large leaves and curious crooked mode of growth always render them beautiful, and the colour of the leaves, at their fall in autumn, is an additional attraction. Three kinds are grown at my garden,—the Dutch, Nottingham, and Royal. The Nottingham (fig. 272) is generally the favourite, as yielding the best flavoured fruit. It is usual to graft medlars on thorns. In my garden they do not fruit in wet soils, though, otherwise, they will perfectly succeed near water. The fruit should be gathered when it easily separates from the tree, and should be kept in a dry place to prevent fungi. Thompson states that it is a good plan to dip the stalk in salt and water to prevent fungus, but this plan has not been tried at Wallington. Now, I keep my fruit room free from fungus by the moderate and judicious use of the fumes of burning sulphur.

FIG. 272.—Medlar.

THE PEAR.

"Insere Daphni piros : carpent tua poma nepotes."
VIRG. *Buc.*, Ecl. iv. 50.

The Pear must be regarded as a luxury of high order ; for although it is not of such general utility as the apple, yet as a dessert fruit it lasts over so long a period, and is so much esteemed, that when upon the table it is almost invariably preferred to the apple and to many other fruits. My collection consists of about two hundred and thirty different varieties. The Pear (*Pyrus communis*) grows wild in England; in fact I see specimens of the wild pear in the hedgerows between my garden and London. It is subject to many varieties, but like the apple, though liable to differences within the limit of variation, it has never been changed into a form which any naturalist could mistake

for a new species. New varieties are obtained by sowing the pips of fine kinds, and then selecting any of the produce which may happen to show any desirable quality either as to its season of ripening, texture, or flavour. Mr. Rivers is endeavouring to obtain new pears by crossing varieties having particular qualities; but time only can show whether success will attend his efforts.

In many cases, it is very difficult to tell whether a real cross has been maintained, and whether the pollen of one plant absolutely fertilizes the blossom of another variety.

When a new variety has been obtained, it may be multiplied by grafting, budding, or layering, the first plan being that most generally in use.

It is much more difficult to procure a new and good kind of pear than of apple or of many other kinds of fruits, for many conditions are required to render it excellent. It must have a fine and distinct etherial flavour. Its flesh must undergo a change in the process of ripening which renders the pulp soft, and it ought not to rot with facility. Even in the list of those reputed to be excellent, in bad seasons and under disadvantageous circumstances some pears never ripen at all, others rot, and some are totally devoid of their normal and peculiar flavour.

Before any person plants a standard pear-tree, he should be well assured of the qualities of the variety he plants, especially as the pear-tree assumes the dimensions of a forest tree, and does not bear till it has attained some magnitude. If a bad kind is selected, the space is wasted for years, which is a serious matter.

Pomologists divide pears into three classes—perry pears, baking pears, and dessert pears. As I grow no perry pears, I shall dismiss them, merely saying that they are unfit for a garden, but should be grown as forest trees in fields, hedgerows, and orchards.

With respect to baking pears,—although all pears may be used with more or less success for culinary purposes,—to my mind a large pear, the Catillac (fig. 273), is the best; and to have it in greatest perfection it should be used as a *compote de poire*, when on its being

cooked it assumes a beautiful red colour. Another enormous pear, the Bellissime d'Hiver or Uvedale's St. Germain (fig. 274), is used in the same way. This pear is shown in the Palais Royal at Paris or at Covent Garden in London, to attract customers; and thirty shillings is sometimes demanded for a single pear. When in its finest state, it is so handsome that it may be used as an ornament on the dinner table, and as it is not eatable in an uncooked state a single dish will last the entire winter.

FIG. 273.—Catillac.[1]

Dessert pears are in use from the middle of July till May; though it must be admitted that after January, and sometimes after Christmas, it is difficult to maintain a supply in the highest state of excellence.

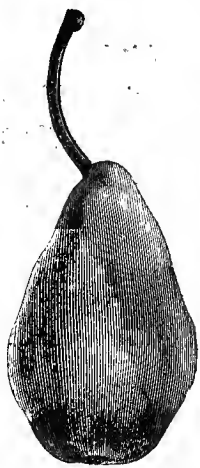


FIG. 274.—Uvedale's St. Germain.

FIG. 275. Doyenné d'Été.

FIG. 276. Citron des Carmes.

Although I grow so many kinds of pears for the purpose of curiosity and trial,—and those which are grown have been selected for their reputed excellence,—yet there are certain sorts upon which reliance must be placed for the main crop.

The list that I recommend, consists of pears which ripen from July till the middle of February. The first pear which ripens is the Doyenné d'Été (fig. 275), a small pear which is pleasant in flavour and in use in July, when the flavour of a pear is a novelty, and is consequently appreciated. The Citron des Carmes (fig. 276) follows closely upon it, and when in perfection is more excellent. It lasts, however, but a few days. Following closely upon these, the Jargonelle (fig. 277) ripens, with its piquant etherial odour which modern chemistry has imitated in the oil of Jargonelle pear; an ether, however, which is

[1] All pears are drawn one-third of their natural diameter.

not extracted from pears but from fusel oil. The pear drops sold at the shops are flavoured exclusively with this oil. Some authorities consider that this pear was mentioned by Pliny, and was introduced into this country by the Romans. It attains great perfection at

FIG. 277.—Jargonelle.

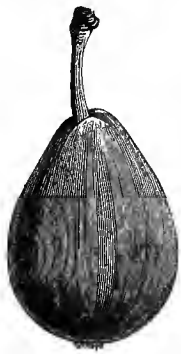


FIG. 278.—Beurré Giffard.

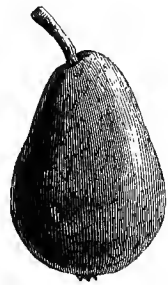


FIG. 279.—Williams' Bon Chrétien.

Rotherhithe and Deptford; and I have tasted it, but not so good, on the St. Gothard pass in Switzerland. This pear keeps but a few days, and is succeeded by a modern pear called the Beurré Giffard (fig. 278). It is excellent in some years, but is so little in cultivation that I have never seen it in any other locality than at my garden.

The Beurré Giffard is succeeded in September by that generally well-known and largely cultivated favourite, Williams' Bon Chrétien (fig. 279), a noble full-sized pear, which requires to be kept a few days after being gathered, to enable it to attain the perfection of texture and pleasant juicy flavour which renders it so great a favourite. It is a great bearer, and should always be grown.

Between the time of the perfection of Williams' Bon Chrétien and Louise Bonne, the Alexandra (fig. 280) proves useful, though it is hardly a pear of the highest excellence.

FIG. 280.—Alexandra.

FIG. 281 Louise Bonne of Jersey.

When Williams' Bon Chrétien has passed away in September, Louise Bonne of Jersey (fig. 281) is gratefully received. This one,

taking it all in all, is the perfection of a pear. Its excellence of flavour, its hardiness, its constancy of bearing, its uniformity of ripening, with its beauty of form and colour, together with its texture and power of keeping a reasonable time, render it one of the most desirable of fruits.

About this time Thompson's (fig. 282) ripens. It is of the highest excellence, and should not be omitted from any garden.

FIG. 282.—Thompson's.

FIG. 283. Marie Louise.

The Louise Bonne in its turn gives place to Marie Louise (fig. 283), the great gift of Van Mons to the world. This is the best of thousands of seedlings this distinguished pomologist raised. All gardeners contrive to keep their Marie Louise as long as possible. Unfortunately, the blossoms of this fruit very badly withstand the frosts of spring, and so the trees seldom give a crop.

November now arrives, and brings with it a pear—the Beurré de Capiaumont (fig. 284)—which is hardy, and constantly gives a crop. I think it a useful pear, but it is unsaleable in the market, and is generally sold on the barrows in the streets.

After, or about the same time as the Beurré de Capiaumont, the Beurré Clairgeau (fig. 285) ripens. Although a coarse pear, it

FIG. 284.—Beurré de Capiaumont.

FIG. 285.—Beurré Clairgeau.

FIG. 286.—Doyenné de Comice.

FIG. 287.—Crassane.

is very handsome on the tree, and a great bearer. The tree assumes the same form as one of the upright Lombard poplars. It

is certainly worth while to have a single tree, but it is at best a second-rate pear.

The Doyenné de Comice (fig. 286) next follows. It is a pear of the highest order. It is exquisitely delicious, and should be extensively grown, and no other pear will be eaten as long as this excellent variety lasts. I have only lately become acquainted with its high merits, but as soon as I knew them I procured more trees.

This is followed by General Todleben, which is a new pear, and still but little known. I have not found it a good bearer, but the specimens which I have tasted have been excellent.

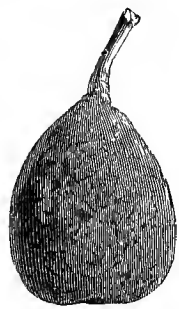


FIG. 288.—Beurré Superfin.

The Crasanne (fig. 287) is remarkable for its long stalk and globular form. It is a delicious juicy pear, and is often grown against a wall.

Beurré Superfin (fig. 288) now comes into season, and this is a very fine pear. This is followed by Beurré Diel (fig. 289), a large pear, very unequal in its qualities; when it is really fine, it is a superb pear. This, again, is followed by the surpassing Chaumontel (fig. 290). In the Channel Islands it attains the greatest perfection, and good specimens fetch 5*l.* a hundred. At my garden they never attain a very large size, but in a neighbouring garden, on a wall, I have known them to be grown on an

FIG. 289.—Beurré Diel.

FIG. 290.—Chaumontel.

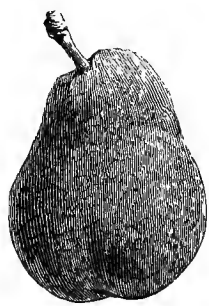


FIG. 291. Duchesse d'Angoulême.

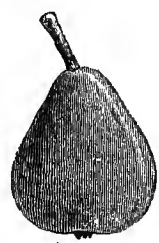


FIG. 292.—Joséphine de Malines.

old tree of such a size and of such a flavour that they could not readily be distinguished from the justly celebrated Jersey specimens.

The Duchesse d'Angoulême (fig. 291) is a large pear, extensively

grown in France and imported into England. In this country it bears, but has little flavour.

As we get late in the season,—as at the end of November and beginning of December,—the order of ripening is more uncertain, but still we have pears the fruit of which is of the highest order. Amongst these late pears the Joséphine de Malines (fig. 292) stands unrivalled. It is so delicious that it surpasses the peach in flavour, juiciness, texture, and in refreshing qualities. Notwithstanding its general high character, I have known it to be worthless, and in 1869 my specimens were no better than raw turnips.

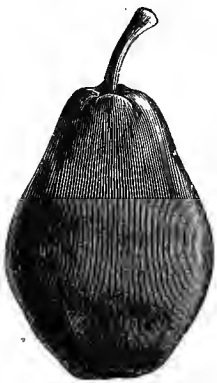


FIG. 293.—Glout Morceau.

The Glout Morceau (fig. 293) ripens about this time. The fruit is better from a standard than from a wall tree, and specimens which were grown at Peterborough House, Fulham, and kept till February, were finer than any other pears which I have ever tasted either in this country or in France.

About the middle of December a common-looking pear ripens, which has so indifferent an appearance that some housekeepers refuse to put it on their masters' tables. This is the Nelis d'Hiver (fig. 294), which is, in my opinion, one of the finest of all the fruits of the earth, and should always be cultivated.

The Ne Plus Meuris is a fine pear, but the blossom is constantly destroyed by the spring frosts, and I have had but little produce, although I have several trees. Huyshe's Victoria (fig. 295), raised from the Marie Louise, promises to take a high position amongst pears, but, up to this time, it has not borne well in my garden.

FIG. 294.—Winter Nelis.

FIG. 295.—Huyshe's Victoria.

The Beurré Rance (fig. 296) is another fine late pear, which keeps well till the spring. Passe Colmar has a peculiar flavour, and the Easter Beurré (fig. 297) is useful for spring use. This variety is liable

to the pear fungus, which makes it crack, and renders it useless for food. There is one more pear strongly commended by Rivers, the Passe Crasanne,. but I have no experience of it, as my trees have not yet yielded fruit, and therefore I must leave him responsible for its high commendation. I have been unable to obtain a specimen to figure.

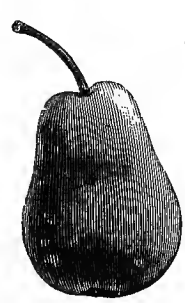


FIG. 296. Beurré Rance.

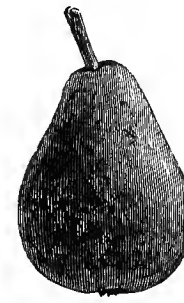


FIG. 297. Easter Beurré.

From my experience, the above varieties form a collection which is sufficient for the requirements of most families, and will give them fruit for dessert for at least eight months in the year. There are many other good pears which may be grown. Green Chisel ripens in August. Beurré Goubault is a constant bearer and a fair pear. Beurré Bosc and Pois de Paradis are both good pears: the former does not travel well. Beurré d'Amanlis is often recommended, but it is a handsome large pear utterly devoid of flavour. The Autumn Bergamot is not to be despised in November, and the shy-bearing Gansel Bergamot is very fine: we grow it double-worked. Durandeau is a charming pear, but we never get many; and Beadnell's Seedling, a pear raised by a friend at Tottenham, is generally commended by pomologists; it, however, speedily rots when gathered. The Vicar of Winkfield is frequently a great bearer, and some years it is large and eatable but no more can be said in its praise. Knight's Monarch and Broompark are occasionally surpassingly fine, but the fruit of the former constantly drops prematurely. Leon le Clerk is also excellent.

A pear called the Bezi Mai has been introduced into England from France. It is a very handsome pear, but with me remains hard till the next summer. From its good bearing qualities it may prove a valuable kitchen pear.

The Napoleon pear has a distinct ætherial flavour in its juice The Beurré Van Mons is a delicious pear; the Dorothée Royale Nouvelle is a fine pear. The America is worthless; the Nouveau

Poiteau is but middling, but the Nouvelle Fulvie is so exquisitely delicious that its properties should be immediately more carefully studied. Amongst the newest pears I have lately added is the Brockworth Park. Opinions differ as to its quality, and I have not myself tasted it. I have tasted the Autumn Josephine, which appears promising, and Powell's Premier, which has merits. There is another very handsome new pear, called the Benedictine (fig. 298); but our great pomologist, Dr. Hogg, informs me that this pear is only a variety of Brown Beurré. My trees not having borne, I have been unable to test the matter. All the later kinds of pear are more or less capricious in their flavour and texture, as well as in the precise time at which they ripen. After Christmas the quantity of pears dwindles, but this depends a great deal upon the thorough ripening of the fruit in autumn. In the spring of 1870 I was in Italy, and we had pears there till the beginning of May. The kind in use was the "Epine d'Hiver." It was juicy, and eatable in the absence of any other fruit, but most assuredly would have been cast aside for any of the kinds which I have recommended.

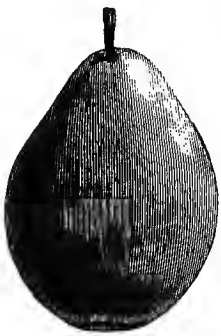


FIG. 298.—Benedictine.

All pears in some seasons are apt to be gritty; that is, have pieces of hard woody tissue in their texture, which Quekett states to be an aggregation of a number of cells composed of a material called sclerogen (fig. 299), which gives the hardness to the stone of the plum, to the shell of the cocoa-nut, and to the ivory-nut. It is a good object for the microscope.

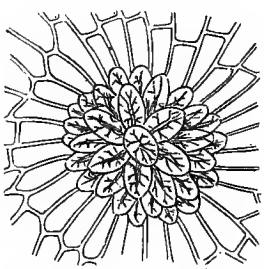


FIG. 299.—Grit of Pear, magnified.

At Wallington my pears are almost exclusively grown on the quince stock, and are worked close to the ground. Some few varieties, such as Gansel's Bergamot and Marie Louise, are worked upon a pear which has itself been grafted upon the quince; and a very few, such as Jargonelle and Ne Plus Meuris, are grown on the pear stock

because they do not succeed well when they are grafted on the quince. I have seen pears grown on the common thorn, but I have none such in my garden. My quince-rooted pear-trees are grown as pyramids (fig. 300), all cut to one height, nine feet, and taking the general form of a "Jack in the Green," which used to delight the little boys and girls on May-day.

FIG. 300.—Pyramid Pear on Quince

The rule is to pinch the top shoots in June, when the first shoots appear, and it is a good plan to pinch back the young shoots to about three leaves at the upper half of the tree a few days before the shoots of the lower half of the tree are touched, because the upper shoots have a tendency to grow much more strongly than those on the lower half. In regulating the general form of the tree, great care is taken that the upper branches do not overshadow the lower branches, as this renders them fruitless. These lower branches should nearly touch the ground, but some years ago I had a gardener who gave himself great trouble to displease me by altogether removing many of the lowest branches of my pear-trees, because in his opinion they were worthless for the production of fruit.

In winter, when the exuberant shoots of the trees are cut back, care should be taken not to cut off the bearing spurs, which may be known by the size of the fruiting buds, as the shoot buds are much smaller, as will readily be seen by the annexed drawing (fig. 301). In winter, when all the trees are cut to one height and form, they have a neat appearance.

FIG. 301.—Pear Branches.

Wherever I have been on the Continent I have noticed that the pyramid on the quince stock has been the favourite form of tree for dessert pears, and the kinds which I have observed in France and Italy are mostly those which are

esteemed in this country, and which are cultivated at Wallington. I have one tree planted as a cordon (fig. 222), that is, as a single rod trained a few inches above the ground; but this I regard rather as a fanciful conceit than a practically useful contrivance.

Pyramids about two feet in diameter form beautiful objects to be placed along the side of the walk. My pear-tree walk is so arranged; and it certainly presents a pretty effect, both when the trees are neatly trimmed in winter and when they are in flower, the promise of spring, or laden with fruit, the performance of autumn. Throughout Europe, pyramid dessert pears are arranged by the side of paths. When pears are grown against walls, we train them as though they were espaliers. It is desirable to grow the earliest, and some of the latest, in this way.

The trees should be planted in good top spit loam. If they grow too luxuriantly, it is desirable to lift the tree in winter, and to lessen the fibrous roots. Dr. Hooker pointed out to me the bad effects of leaving dead roots with fungus in the earth where trees are growing, as they are apt to injure their growth, or kill them. This fact has been overlooked by those who recommend frequent lifting of trees and replantation in the same place.

After a year or two, manure is certainly advisable, which may be either spread over the ground or lightly trenched in. Woollen material has been tried in my garden by simply laying it on the ground around the stem of the tree. The little rootlets so much like this material that they form a complete interlacing, but when the wool is rotten the rootlets are apt to perish, which is not desirable, and therefore wool should be discarded as a manure. Where manure is necessary, the best stable dung is preferable.

In the poor exhausted humus of the ground of Wallington, old brick rubbish is very desirable; the pieces of broken brick, the sulphate of lime, carbonate of lime, and sand, mixed together, being favourable to growth.

The pear pyramids in the month of April are particularly lovely when covered with their beautiful flowers, but let us not be deceived by

appearances, for experience here shows, the more the flower the less the fruit. The fact is, that an enormous display of blossom is very exhausting to the tree, and a tree with excess of blossom generally has no fruit at all. When, however, there are but few blossoms every one will set, and there will be a plentiful crop of fruit. An undue crop of fruit also exhausts the tree, and prevents the fruit itself from coming to perfection.

Upon these grounds the successful growth of pears in the open ground depends upon the trees having a due balance of leaves, flowers, and fruit. Too much growth and too many leaves give no fruit, too many flowers prevent fruit, and too much fruit in one year prevents the development of fruit in the succeeding year.

Gardeners grow pears on a quince stock in order to lessen the intensity of the woody growth. In nature, a pear-tree is a large forest tree; in cultivation, the pyramid is a mere bush or shrub. To take advantage of the power of the quince stock and to lessen the growth of the pear, we must be careful to prevent the pear stock from reaching below the ground, or this will happen,—the pear stock will send out roots, when the tree will no longer remain a quince-rooted pear-bush, but will become a pear-rooted forest tree.

For some years I did not know how to deal with the graft, whether to keep it above ground or place it below, till experience taught me that all my beautiful pyramids might be spoilt if I did not take care to prevent the pear roots from being formed, or, when formed, if I did not quickly cut them off again.

At Wallington I have very few standard pear-trees, and such as I have present no features for comment, as they have been rather tolerated than cultivated; but, wherever there is space, everyone ought to cultivate a standard Louise Bonne, Jargonelle, Marie Louise, Beurré de Capiaumont, Beurré Superfin, Glout Morceau, Doyenné de Comice, Nelis d'Hiver, and Catillac.

To ensure a crop of fruit, protection in spring has been recommended, but I doubt its efficacy. I once thought of trying an experiment by covering my pyramids with crinolines. For this purpose

I went to a large manufacturer, but could not agree upon a reasonable price. On a sudden the vendor said, "I beg your pardon, sir, but what possibly can be your object in wanting to buy so many crinolines?" "To cover my fruit-trees," was the reply. Whereupon the dismay of the manufacturer was great, as he declared that their use for such an object would cast a lasting ridicule upon the article, and injure its sale.

Many of the quince-worked pears I have planted in pots. Citron de Carmes, Doyenné d'Été, Joséphine de Malines, and the Chaumontel I have successfully cultivated in this way in the orchard-house. Those allowed to ripen in the house are generally very inferior in flavour to those grown out of doors; but if they are allowed to set their fruit in the house, and the trees removed out of doors about the 1st of June, a crop is secured, and their excellence is maintained.

Pot pear-trees require great care in watering, and a supply of liquid manure at the times when the flower sets, when the pear first swells, when the pips form, and when the fruit is perfecting itself. It is also advantageous at these critical times to give manure water twice a week.

If the pyramid is in thorough condition, the young fruit will bear moderate, but not excessive, frost in spring. The trees bore excessive drought and heat very badly in 1870, and numbers of pears ceased to grow therefrom. Perhaps the crop is most certainly secured by keeping the trees in a perfect balance of leaf, flower, and fruit, by judicious moderate root-pruning or manuring. I have considered it desirable to give to all my trees some phosphate of lime by throwing bone-dust over the ground, and I apply a little stable manure to the surface every year.

Mr. Thompson advised me to grow pear-trees on quince stocks as espaliers, as he thought they would pay well. I never tried the experiment, though the dictum of so great an authority deserves full consideration.

The pear should be gathered when it comes easily from the tree. It then should be placed in the fruit-room, each pear separate from the others, and care must be taken to watch the fruit as it ripens. When

about to ripen, it is not desirable to move it to any distance, as concussion renders it liable to decay. Pears ought always to be moved from the fruit-room in the garden to the house, and kept a few days, so as to ripen before they have to be used. In the fruit-room the same precautions against fungus, as have been already recommended in the storing of apples, should be taken by burning sulphur.

It is essential that pears should be kept till ripe. They are in perfection but a very short time, as immediately after they are fit for use they rot. If used before they are fit, they are hard and worthless. Their juiciness is their great merit, to which the poet alludes when he sings:—

"The juicy pear
Lies in a soft profusion, scattered round."—THOMSON.

THE QUINCE.

Two kinds of Quince are grown with me, the common quince and the Portugal (fig. 302). The latter is not only far larger, but is also a better bearer and more finely flavoured. As this fruit is only required for confections and to give a flavour to apple tarts, a single tree of the

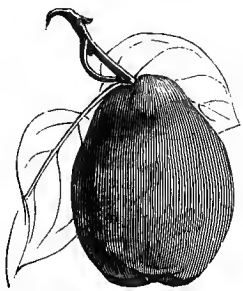


FIG. 302.—Portugal Quince, ⅓ diam.

FIG. 303.—Flower of Portugal Quince.

Portugal quince will suffice for a family. Although they like to gro near water they do not succeed in very wet soil, and in that situation I have had trees more than ten years without their showing even a single flower. Trees may be readily propagated by layers or from suckers. A tree laden with the large Portugal quince is very beautiful, and its large, white, prominent flowers (fig. 303) are equally ornamental.

THE PLUM.

"I will dance and eat plums at your wedding."
SHAKSPEARE, *Merry Wives of Windsor.*

The Plum (*Prunus domestica*) is a useful fruit in its season. We grow about seventy kinds, but there are innumerable varieties, some named and some without names, which are in use. New varieties are obtained by sowing the seeds of approved kinds, and varieties are propagated by budding the desired kind on a plum stock. When a plum is on its own roots, it may also be propagated by suckers.

FIG. 304.—Rivers' Early Favourite.[1]

FIG. 305.—Lawrence's Gage.

FIG. 306.—Green Gage.

FIG. 307.—Golden Drop.

Plum-trees do not grow well in my soil, and I have been compelled to raise many of the trees and plant them in loam; nevertheless, we always obtain sufficient for the use of the house. The first dessert plum which we ripen is Rivers' Early Favourite (fig. 304), which is constantly fit for use about the third week in July, when grown on a bush. The Early Mirabelle is a nice little plum, following close upon it. The Reine Claude Violette is a very beautiful fruit; it and Kirke's, both of which ripen in September, are fine purple plums.

The Orleans plum is excellent when ripe, and the Jefferson is very fine. Lawrence's Gage (fig. 305) is a fine plum resembling the Green Gage. It ripens at the end of August. The Goliath, which is generally abused, is better, when ripe and well grown, than is reputed. The Green Gage (fig. 306) is by common consent the king of plums, but then in this country it is a bad bearer. When it does bear, the fruit is magnificent; and no garden should be without standard trees, which the cultivator may be perfectly certain will bear some years, but not every year. Coe's

[1] All the figures of plums are drawn one-half of their diameter.

Golden Drop (fig. 307) is a magnificent plum. It has the valuable quality of keeping a long time after it has been gathered, especially if wrapped up in paper and hung in the fruit-room. Ickworth's Impératrice (fig. 308) is a delicious plum when ripened and quite shrivelled. It is covered with the most exquisite purple bloom, and will keep a long time in a dry fruit-room.

The Belgian Purple (fig. 309) is reputed to be a very fine early plum, but although I have a tree, I cannot say that I am familiar enough with it to be able to speak positively as to its merits.

Plums are especially adapted for culinary purposes, as they last from

FIG. 308. Impératrice.

FIG. 309.—Belgian Purple.

FIG. 310.—Prince Englebert.

FIG. 311.—Belle de Louvain.

July till November. Rivers' Prolific ripens in July. There is an early sort grown in Kent, the name of which I could never learn, which is fit for use about the same time. The Prince Englebert (fig. 310) is very

FIG. 312.—Yellow Magnum Bonum.

FIG. 313.—Gisborne.

FIG. 314.—Black Diamond

FIG. 315.—Prince of Wales.

large, rich, and excellent, bears profusely, and is ripe in the middle of August. The Belle de Louvain (fig. 311), which ripens a little later, is a large, deep purple plum, and is hardy.

The Yellow Magnum Bonum (fig. 312) is a fine large plum, much used for conserves, but it is apt to ferment unless carefully preserved.

Gisborne (fig. 313) is a yellow plum which bears prodigiously every season, no matter what may be the weather. It is a good culinary plum which no garden should be without. The Diamond (fig. 314) is very large and handsome, and ripens during the first week in September.

The plum called the Prince of Wales (fig. 315) is a prodigious bearer, rarely failing to give a crop, and that, too, after yielding a crop in the preceding year more than is good for the welfare of the tree. It should be grown in every garden. Although the Washington Plum (fig. 316) is generally esteemed as a kitchen plum, yet it is really good enough for a dessert fruit. The Wine Sour is a plum which ought to be brought into common cultivation. It is a Yorkshire variety, and it has been thought desirable to advise growers in the south to try more extensively this kind. I have a tree, but it does not thrive well; and there is an idea that this plum does not ripen out of Yorkshire.

FIG. 316.—Washington Plum.

We grow the common Damson, but with us it does not bear freely On the other hand, a kind of damson supposed to have been raised by the eminent antiquary Mr. C. Roach Smith, called the Rochester Cluster Damson (fig. 317*a*), is invaluable for its productiveness. I learnt its value from that gentleman, and it is curious to look at trees of this variety laden with fruit, and compare them with the others having none. The Cluster Damson is by far the best culinary plum known. I grow also the Bullace (*Prunus insititia*, fig. 317*b*), which is valuable for confectionery purposes, and comes in later than any other plum.

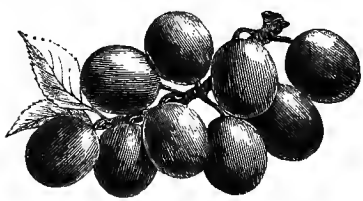


FIG. 317*a*.—Rochester Prolific.

FIG. 317*b*. Bullace.

We grow several kinds of plums in pots in the orchard-house, and the produce is enormous. The flavour of the fruit, however, is greatly

deteriorated—so much so, that I doubt whether it is worth growing any kind under glass except Coe's Golden Drop. Perhaps the overbearing of the tree is one cause, and that may be the reason why the flavour of foreign plums is so indifferent compared with those grown in England. A green-gage grown in a pot is intensely sweet, but has none of that fine green-gage flavour to be found in fruit grown on a bush or standard.

My collection of plums are grown, some as standards, which do best; the remainder as bushes. The shoots of the latter are stopped in June and pruned back in winter. Pruned trees have a tendency to throw out long sappy shoots, which rob the tree and render it unproductive. In some years we are troubled greatly with large green aphides, which cover the under-side of the leaves so thickly that not a pin can be placed between the creatures. I do not think plum-trees like much pruning, as unpruned standards certainly do better than those which are cut to any extent. Rivers recommends a biennial lifting, but this is really a great undertaking when there are a hundred or more large trees.

THE APRICOT.

The Apricot is a fruit of great excellence. In this country it will not bear fruit as a standard, it requires a wall: but we have no walls, therefore we are restricted to its cultivation in the orchard-house. Again we are in a difficulty, as the apricot does not like artificial cultivation, and is extremely difficult to force.

Several kinds of apricots have been tried out of doors, as bushes or trees, but they have never yielded any fruit in my garden, although they blossom in great abundance: we may assume that in our climate they will not bear out of doors.

In the orchard-house we have found the Peach Apricot to be as good as any. The Moorpark Apricot, which is perhaps the richest of all, has the peculiarity of losing branches without any assignable cause. Large branches sometimes laden with fruit suddenly die, and hence

the tree becomes unsightly and irregular. Out of doors the Early, Kaisha, and Breda varieties are frequently grown.

I have had several orchard-house trees of more than one kind, and the fruit we obtain is of most exquisite flavour. An orchard-house apricot, properly ripened, is very different from a wall-grown apricot, as it is ripened throughout, and its flavour is a combination of those of a preserve and a fresh fruit. It is really one of the choicest fruits of the earth. For culture in the orchard-house the tree should be planted in stiff top spit loam and rammed as tight as possible. During growth the tree requires abundance of air, and liquid manure ought to be given at least twice a week. After the crop is ripe the tree ought to be moved out of the house, to fully perfect the wood for the next year. In a history of Moor Park, it is stated that Admiral Anson brought the Moorpark Apricot (fig. 318) from the East, and that it was cultivated at that park under Lancelot Brown, who was afterwards head gardener at Windsor and at Hampton Court.

FIG. 318.—Moor-park Apricot, ¼ diam.

THE PEACH AND THE NECTARINE.

"The sunny wall
Presents the downy peach."—THOMSON.

Strange as it may seem, the Peach and Nectarine are one fruit. If a peach kernel is sown, perhaps a peach, perhaps a nectarine may be produced. As a rule, most seedlings have some merit, and I have been informed that in North America, where the cold in some winters destroys the peach-trees, they plant kernels and obtain others in three years' time, without grafting or without care as to their being special varieties.

In this country we are more particular, and only approved varieties are cultivated, of which there are considerable numbers. Mr. Rivers has been diligent in raising new seedlings. It is a great object to get peaches early, as that prolongs the peach-producing period. His earliest peaches are the Early Louise (fig. 319), and Early Beatrice (fig. 320), which ripens about the middle of July. I have only this year ordered

a tree of each variety, and so their merits have not been tested; but the Early Louise is spoken of in the highest terms. The figures are taken from specimens kindly sent me by Mr. Rivers.

The Victoria is another early peach; it has been very fine for some years, but last year it was comparatively worthless. I grow also the Early

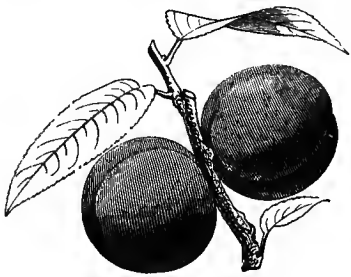


FIG. 319.—Early Louise.[1]

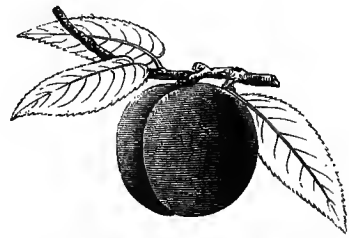


FIG. 320.—Early Beatrice.

Alfred, but it has not as yet fruited. The Abec has fine large fruit, with large ornamental flowers. The Grosse Mignonne (fig. 321) is highly extolled by pomologists; but peaches with down upon the skin are not agreeable to me, as I think them greatly inferior to the Noblesse (fig. 322), which is far more delicious in flavour. The George the Fourth

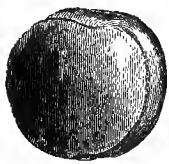


FIG. 321.—Early Grosse Mignonne.

FIG. 322.—Noblesse.

FIG. 323.—Bellegard.

FIG. 324.—Late Admirable.

is another most excellent peach, but very liable to fungous growth. The Bellegard (fig. 323) is a fine fruit, and the Late Admirable (fig. 324) is a peach of the largest size, which ripens when all the other kinds have passed away, and is, when thoroughly in perfection, a fruit of the highest order of merit.

In my orchard-house the peach-trees are grown as trained trees before the glass, as bushes, and as standards. Nothing can be more interesting than to see one of my peach standards covered with its beautiful fruit, and nothing can rival the quality of the fruit when it is so grown.

[1] All the figures of peaches and nectarines are drawn one-third of their diameter.

The peach-trees, when planted for orchard-houses, are grown in pots in good top spit loam with a little well-rotted manure; the earth is rammed tightly in the pot, and is shifted by degrees to the largest-sized pots. A portion of my trees every year are grown in the open air, and the others are fruited in the orchard-house. The trees should be watered with manure water at least twice a week; too much or too little water utterly spoils the quality of the fruit. When the fruit is gathered, it is a good plan to remove the trees to the open air, to be refreshed by the dews, and to obtain the light and air of heaven. When winter comes water is withheld, and the pots are allowed to dry, nevertheless care is taken not to expose the roots to frost, and for this purpose the pots are covered during the winter with straw. In February the trees may be pruned. We find three kinds of buds (fig. 325): one a large, plump, single bud, which is a fruit bud; another a small, long bud, which is a shoot bud; and a third kind which is a triple bud, the bud in the centre being the shoot bud, and the plump bud on each side the blossom buds.

FIG. 325. Peach Buds.

In cutting back the long shoots we cut to the triple bud, as the shoot bud grows and the leaves nourish the fruit should it set. During the growth of the peach plenty of air is required: in fact it is not of much importance if one or two panes of glass are broken; it is much better for apertures to exist by day and night than for the house to be absolutely closed all night.

My experience leads me to conclude that a good mode of treating peach and nectarine trees is to keep the trees in the orchard-house till about the first week in June, when the fruit is set; then to let it ripen out of doors. The fruit, under these circumstances, is smaller, of a much more intense colour, and of a far higher flavour. For the last two or three years I have arranged more trees in the house than it is desirable should remain, and have removed the surplus quantity outside to ripen. This plan, from its perfect success, will be used to its utmost possible extent on all future occasions. I would sooner have one fruit ripened

out of doors than two ripened under glass, although we certainly obtain house peaches of the highest excellence.

NECTARINES.

The Nectarine has been already stated to be identical with the peach. The trees are grown in the same manner in all respects as the peach-trees. We have grown Violette Hâtive, Pitmaston's Orange, Elruge, and others, and I have figured two new seedlings kingly sent me by Mr. Rivers. The nectarine is a most delicious fruit when thoroughly

FIG. 326.—Violette Hâtive.

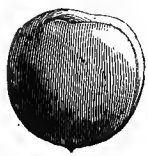


FIG. 327.—Rivers' Orange.

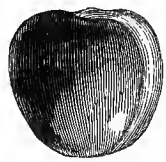


FIG. 328.—Rivers Seedling, No. 23.

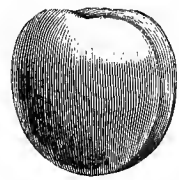


FIG. 329.—Rivers' Seedling, No. 93.

ripened, and it attains high perfection in the orchard-house if grown as a standard, when the fruit is exposed to both light and air. The fruit should hang upon the tree till the period at which it commences to shrivel. The Violette Hâtive (fig. 326) is a capital variety. The Orange nectarine (fig. 327) is very fine, and Rivers has raised several good seedlings (figs. 328 and 329). We have other kinds, but it is hardly worth recording their names.

The most usual manner of training apricot, peach, and nectarine trees,

FIG. 330.—Fan-shaped Peach-tree.

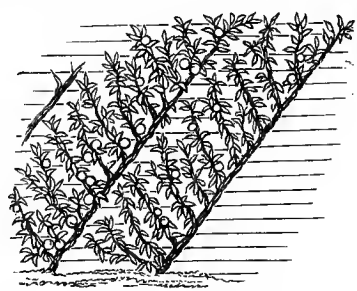


FIG. 331.—The "Cordon Oblique.

in this country, is to train them in the form of a fan (fig. 330), and frequently between two dwarf trees a standard fan tree is grown, so that

the whole wall is covered. The French horticulturists often grow them in "cordon oblique,"—that is, a number of trees are planted against a wall, about two feet apart, at an angle (fig. 331). I am assured that this plan has failed in our village with apricot-trees, and I cannot learn that it has succeeded well in our climate, though I have seen trees so trained in France covered with fine fruit.

CHERRIES.

Cherry-trees do not thrive well in the soil and climate of my garden, so what with the imperfection of the soil which causes the foliage to become yellow, the spring frosts which injure the foliage in May, and the birds which take the fruit the climate does not spoil, I have but little personal knowledge of cherries. It is true that I have planted some thirty kinds of cherry-trees, but my experience is but limited, and certainly a critical comparison between the different kinds is entirely out of the question. Varieties are raised from seed, and propagated by grafting the variety on a cherry stock. The Early Purple Gean is very early (fig. 332), ripening in the orchard-house in May. The Adams' Crown is a good early cherry, ripening at the end of June. The May Duke is a good cherry, ripening in the early part of July. The Black Eagle (fig. 333), and the Bigarreau Duke (fig. 334), were shown in the highest perfection at the Horticultural Gardens on May 3rd, 1871, but the conditions under which they were forced were not stated. The Bigarreau, May Duke, and Late Duke are also excellent varieties.

FIG. 332.—Early Purple Gean.[1]

The Morello (fig. 335) is a magnificent cherry, which attains the highest perfection in our soil. It requires the protection of netting, or the birds get all the fruit. We grow this sort on dwarf bushes, which are pruned in to a reasonable size. This kind of cherry is generally grown on a wall.

[1] All the figures of cherries are drawn one-half of their diameter.

In Kent a fine kitchen cherry is grown, called the Kentish cherry. It is said that the trees are dying out, and are not so productive as they formerly were. There is a very late cherry, ripe in October (fig. 336), which Rivers states is never attacked by birds; however, my birds are

FIG. 333.—Black Eagle Cherry, shown May 3, 1871, at Horticultural Gardens.

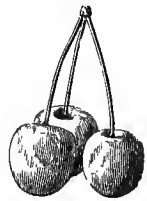


FIG. 334.—Bigarreau Duke Cherry, shown May 3, 1871, at Horticultural Gardens.

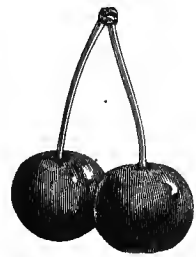


FIG. 335.—Morello Cherry.

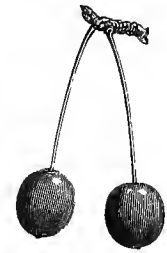


FIG. 336.—October Cherry.

not so complacent. It is desirable to have a single tree, for the sake of a dish of fruit out of season. The cherry-tree likes a soil of rich loam over chalk, which mine is not. In a garden it is necessary to protect the fruit from birds, or they will take the greater part or the whole of the crop.

CURRANTS.

Every garden grows black, white, and red currants. Black Currants (fig. 337) grow well beside the water, and always like a moist, rich soil. There appear to be several varieties which are superior to the common wild one, or the common kind which ordinarily springs from seed. The variety we cultivate I have not identified by name; it yields very large berries. The black currant is easily propagated by cuttings, put in the ground at any time from autumn to March; in fact, if care be taken, probably they can be struck at any time. There is a late variety of black currant, which is very indifferent; I believe it is called the Black Naples.

A new variety, called Lee's Black Currant, is said to have great merits. I have some trees, but have not yet seen the fruit; the character of the wood shows a vigorous growth.

Of Red and White Currants I have tried about sixteen kinds, but

have long ceased to be particular about the varieties. The White Dutch (fig. 338) is a good white currant. It may be forced with care, if well established in a pot and placed early in the vinery. The berries are, however, apt to drop, and but very few remain till ripe; possibly because in a vinery they are too hot, and have not sufficient air. The pruning of the trees requires care, as the fruit is produced from little spurs, so that the art of pruning consists in cutting away the new shoots

FIG. 337.—Black Currants.[1]

FIG. 338.—White Currants.

FIG. 339.—Red Currants.

and carefully leaving the spurs. I have grown currant-trees as bushes, as pyramids, and as standards, but without any decided benefit. Pyramids may be planted a foot apart, allowed to grow up about two feet and a half, when a considerable number can be conveniently matted to give fruit in November, or covered with nets to prevent the birds from helping themselves too freely.

Of Red Currants, the Red Dutch (fig. 339) is a good kind. I have grown Knight's Sweet Currant, but never found it sweet, although grown against the palings.

GOOSEBERRIES.

The Gooseberry is essentially an English fruit. It is cultivated but to a small extent in countries south of England, but it is only in the north of England where it is particularly an object of cultivation, and where it attains its highest perfection. Numerous shows of Gooseberries

[1] Figures of currants are drawn one-half the natural size.

are held in the North, where size rather than quality is rewarded, and a book is annually published detailing the varieties of gooseberries which obtain prizes, and the weight to which each individual berry has attained. Gooseberries are propagated by seed when new varieties are sought, and the varieties are propagated in the easiest manner by cuttings or layers: in fact, a shoot touching the ground often roots by itself. The tree is best grown as a standard, with a stem about a foot high, from which the boughs radiate in every direction. I have seen bushes trained upon wire trellises, but this is a bad plan, as the fruit in early spring is not protected by the leaves, and is apt to be injured by the frost. The pruning of the gooseberry must be performed with scrupulous care, as only the new wood bears. A reasonable amount of the old and of the new wood must be cut out, to let air and sunshine into all the parts of the bushes, and a due amount of new wood must be left, from which the crop proceeds. When trees are grown to produce exhibition fruit, only two or three of the same year's shoots are left. This plan I never practise, as the fruit should be tested by its qualities for the table, and not by its magnitude and weight.

The Gooseberry is particularly liable to be affected by spring frosts, as then nearly the entire crop of little berries drop. This happened in 1871. The bush is also liable to be attacked by the Currant moth, but the birds have prevented this at my garden. Sometimes I have known an Acarus, or species of red spider, severely to injure the trees but this has not happened at my garden, as my trees, when properly exposed to light, are pictures of health and of vigorous growth. The trees like manure, and some should be given to the ground every year I have grown more than a hundred varieties, but have not found it worth while particularly to record their names, and if many varieties are desired it is advisable to have recourse to the Manchester nurserymen. Mr. Turner of Slough exhibited at the Horticultural Society a fine collection of seventy varieties, and he has kindly supplied me with the named fruit to figure. Of one of the finest varieties, but a very bad bearer, called Companion, I was unable to find a berry anywhere, as all had been killed by frost.

The first gooseberry that ripens at my garden, in June, is a yellow gooseberry, which is a great bearer and of medium size; it is called the Early Sulphur (fig. 340).

The Green-gage is another fresh-flavoured, early gooseberry; and of the Red Warrington (fig. 341) there should always be many trees in a garden, as it will last in perfection till the first or second week in September, and is second to none in flavour. Rumbullion is also a fine gooseberry. Of the large gooseberries, Broon Girl (fig. 342) is a fine variety of the yellow kinds; Smuggler (fig. 343) is another fine yellow variety; Crown Bob (fig. 344) is also a good red variety. Banksman (fig. 345) is a large green gooseberry. With regard to goose-

FIG. 340.—Early Sulphur.[1]

FIG. 341.—Red Warrington.

FIG. 343.—Smuggler (yellow).

FIG. 342.—Broon Girl.

FIG. 344.—Crown Bob.

FIG. 345.—Banksman.

berries it is desirable to have many trees of the Early Sulphur, Green-gage, as well as of the Red Warrington, and then to add one tree of many varieties of the red, white, green, and yellow sorts.

The gooseberry is especially the cottager's fruit; though those accustomed to live at their country seats value much their gooseberries. Fine fruit is rarely to be obtained in London, and not then unless the markets are visited for that purpose. At least from one to two hundred trees should be grown in every private garden.

[1] All figures of gooseberries are drawn one-half the natural size.

STRAWBERRIES.

There are but few persons who do not thoroughly enjoy well-ripened Strawberries, fresh from the garden, with cream; nevertheless there are some persons to whom, as a matter of peculiarity of habit, a single strawberry is poisonous. As the latter are the exception, the majority are to be provided for. We calculate on having strawberries from the 1st of May till the middle of July, and Alpine strawberries in continuation till the frost destroys them. In Scotland, strawberries begin to ripen a month after they have finished in England, but they are destitute of flavour.

The varieties of strawberries are legion, and are obtained by sowing seed and by selecting those which are finest. Particular varieties are propagated by runners. The method we adopt is to fill a "sixty" pot with loam and place a runner upon it, and keep it there with a stone. In a short time the runner takes root, when it is shifted into a larger pot, or planted out, as may be required.

For our first crop we plant about two hundred plants of Keen's seedlings in "thirty-two" pots in rich top spit loam, and carefully water them throughout the summer to ensure good growth and abundance of roots. During the winter the pots and roots are carefully protected from frost. At the end of February the pots are plunged, about one-third of their depth, in the cold frames, keeping them sufficiently apart to ensure the action of the sun upon the leaves. They are then watered with manure water, and the fruit ripens about the 1st of May, and lasts till strawberries ripen out of doors. This first crop of strawberries is sometimes the best of all. Their perfume is penetrating, and the flavour intense; but then, if we desire either flavour or odour, the plants ought not to be watered for two or three days before the fruit is picked. This simple plan should be invariably adopted in every garden, as the plants can be grown in the same frame which was used to protect the cauliflowers from the frost: not less than a hundred plants should be grown to secure a good supply of fruit. We rarely force any plants, but the cold-frame strawberries

far surpass the earlier forced, or even the outdoor fruit; and they are a great luxury during the month of May and the first week of June.

Out of doors we change the beds, according to circumstances, every two or three years, and we generally keep each plant distinct in rows two feet apart, and two feet distant in the row. About February the whole bed should be covered with fresh long dung. The spring rains thoroughly clean the straw and wash the manure into the ground, and a good covering is left for the strawberries to ripen. It is objectionable to manure the strawberries in winter, as then the straw is thoroughly rotted before the fruiting season, and the wet during the winter is apt to rot the plants. In spring, the young leaves push through the straw, and are protected by it from frost.

One of the varieties of strawberries we grow is the Black Prince (fig. 346), which ripens out of doors the first week of June. When ripe it is a first-rate fruit. It is small but hardy, and in some years (as 1871)

FIG. 346.—Black Prince.[1]

FIG. 347.—Keen's Seedling.

FIG. 348.—British Queen.

FIG. 349.—Amateur.

yields a greater crop and finer strawberry than any other kind. It remains some time in fruit, and when larger strawberries succeed it is useful for preserving. The plant is small, the leaves are peculiar, and it is better to let it stand for some years in the bed. There is another early strawberry, called the May Queen, which is unworthy of cultivation. Following the Black Prince, the great standard strawberry of gardens, the Keen's Seedling (fig. 347), ripens. As a rule it yields a larger crop than any other, but exceptionally in 1871 it yielded none at all; the entire fruit having been destroyed by frost. The Keen's Seedling is the strawberry for forcing, as well as for the main crop, and therefore never should be dispensed with. Then follows

[1] All figures of strawberries are drawn one-half the natural size.

the British Queen (fig. 348), the most exquisitely flavoured strawberry which exists. The plant is, however, very delicate in its constitution, and likes a strong top spit loam, such as the soil of a wood cut down and newly cultivated, when it attains its highest excellence.

My plants have been attacked in summer by a kind of Acarus, or red spider (the exact species I have not determined), and with me they are very difficult to grow.

A fine strawberry was exhibited last year at the Horticultural Society, called the Amateur (fig. 349). It was so good that it was immediately awarded a first-class certificate. It was raised by Mr. Bradley, who had the good fortune to raise another variety, named after the great pomologist, Dr. Hogg (fig. 350), which should always be cultivated. Those who desire very large strawberries may grow the Eleanor (fig. 351); and for a late strawberry the Elton must be

FIG. 350.—Dr. Hogg.

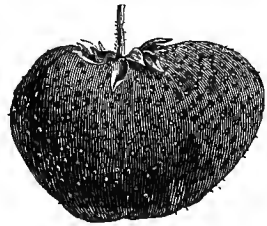


FIG. 351.—Eleanor.

FIG. 352.—Eliza

grown. These should be the standard strawberries of a garden to which may be added Rivers' Seedling Eliza (fig. 352), which, however, with me has not been remarkable.

The above strawberries—especially the Black Prince, Keen's Seedling, British Queen, Dr. Hogg, and the Elton—should be stock varieties in every garden: nevertheless many others have been grown at my garden. Princess Alice Maude is a good strawberry; Sir J. Paxton may be commended; Carolina Superba and the Crimson Queen are both fine. The Filbert Pine and Myatt's Pine are good; Nimrod is a useful variety. We have grown Dundas, Empress Eugénie, Frogmore, Late Pine, Sir Charles Napier, Victoria, and Wonderful. We have also tried Sir Harry, Prince of Wales, President, Oscar, Comte de Paris, and Princess of Wales. I have had Hautbois for years, but although I have tasted the fruit I never had a dish.

Besides these common varieties, we are very particular about our growth of Alpine strawberries. I have grown many kinds, of which there are two, one white and the other red, without runners, which are commendable. These may be raised from seed early in spring in a seed frame, and pricked out, when they fruit in the autumn of the same year. But for Alpine strawberries we rely upon a variety the seed of which I procured in Paris some years ago (fig. 353). Young plants are planted out early in spring, when they bear immediately after the ordinary

FIG. 353.—Perpetual Alpine Strawberry.

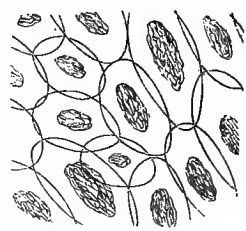


FIG. 354.—Cells of ripe Strawberry.

strawberries, and last till autumn. They should be eaten with claret and sugar, as is the custom in France. A few put into claret-cup impart a very agreeeable flavour.

The strawberry fruit is built up of cells with brown central nucleus, as Quekett has shown (fig. 354).

The strawberry likes good soil; so does the nettle: hence the allusion of our poet when he says:—

> "The strawberry grows underneath the nettle;
> And wholesome berries thrive and ripen best,
> Neighbour'd by fruit of baser quality."
>
> SHAKSPEARE, *King Henry V.*

RASPBERRIES.

The wild fruits of the country have given to us various varieties of raspberries valuable for our winter preserves. The Falstaff (fig. 355) is a fine variety which we grow, and Red and Yellow Antwerp are also tried kinds. To raise different varieties, seeds must be sown;

and in our garden, where birds abound, raspberries come up all over the place. Particular varieties are propagated by suckers. The canes which have fruited are cut down in autumn, and two or three of the year's growth are left to fruit the next year. Sometimes we have tied these canes to sticks, and at other times we have tied them to wires stretching between posts. There is an autumnal

FIG. 355.—Falstaff Red Raspberry.

FIG. 356.—Yellow Autumn Raspberry.

raspberry (fig. 356) which gives us some years, though not invariably, fruit as late as November. A dish of the autumn raspberries is particularly grateful and refreshing; but I never could find out how to manage it so as to be sure of fruit. The autumn raspberries are both yellow and red: I have figured the yellow.

We have Rivers' cross between the Blackberry and Raspberry, but it very seldom sets any fruit: I have only had a few berries, which are of a dark colour and fair flavour, but not so good as either the Blackberry or Raspberry. Its want of productiveness makes it useless at present; nevertheless the experiment is quite worth further trial. He has raised other varieties also, which are stated to be better; of these I have one or two which have not yet fruited.

The Raspberry is of great value in a household, and therefore should be always freely grown. It grows wild plentifully near Weybridge, but not so profusely as it does in Scotland, where it is more common than the Blackberry.

GRAPE VINES.

At various times I have grown at my garden many kinds of grapes, but for want of space the number has been gradually limited to a few. The varieties in cultivation are innumerable, and a

gentleman at Naples told me that he had more than two hundred kinds in his garden. At Wallington we grow no outdoor vine. In the orchard-house about eighteen varieties were tried, but failed. The growth of the peach, nectarine, apricot, and fig is the especial object of the orchard-house, and the treatment they like does not seem to be agreeable to the vines, as very few bunches ever come to perfection. The vines in the orchard are continually attacked by the Erisaphe or oïdium (see Fungi), and the crop rendered worthless.

In the Poor Man's House we restrict our kinds to three, one vine being a Sweetwater, a second the Black Prince, and the remainder the Black Hamburgh.

The Poor Man's House is situated on a bed of coarse, poor gravel, but I planted the vines in it as an experiment. The vines made hard, short-jointed wood. They were planted four feet apart; and as the glass is ten feet long, each vine had forty square feet of glass. Since they have been planted the vines have been manured yearly with stable dung. They have had ivory dust sprinkled over the ground, and the best top spit loam, from four to six inches, has been placed at the top of the soil.

The colour of the grapes is perfect, the size of the bunches large; the individual berries are also large, but the flavour is most intense; in fact, I think that these grapes are the best I have tasted anywhere. In this house, which has 480 superficial feet of glass, 204 bunches were produced in 1871, of about 152 lbs. in weight.

The house has only two 3-inch pipes, but the heat from them is sufficient to start the vines by February 15, to flower them by April 5, and to ripen the fruit from the 1st till the middle of July.

In the Grapery the vines are kept back to start as late as possible, to ripen their grapes by the first week in September, when they give fruit till the end of February. Here the vines were planted in top spit loam with some brick rubbish, but this border has not proved so good as the natural soil, as the loam was too heavy. I intend to rectify this border by removing some of the heavier loam, and by adding stable manure and brick rubbish, which I believe,

for all fruit trees and for many other plants, is the best material for their healthy growth.

The kinds of grapes which, from my experience, should be grown, are, first, the Black Hamburgh (fig. 357). This, upon the whole, is the best of all grapes. It does not keep very late after being ripe, but

FIG. 357.—Black Hamburgh.

FIG. 358.—Black Prince.

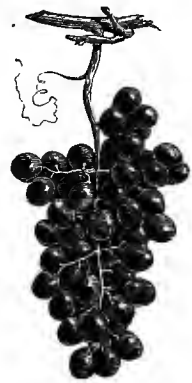


FIG. 359.—Trentham Black.

becomes thick in the pulp. The larger number of vines should always be Black Hamburgh. A Sweetwater comes in a few days earlier than a Black Hamburgh, and therefore one vine should be of this kind. Standish has a Sweetwater which is unusually early, but it has not as yet fruited with me. One vine in every collection should be the Black Prince (fig. 358), which, although it sometimes fails, is a nice juicy grape. One vine also should be the Trentham Black (fig. 359), which is also a juicy and refreshing grape, and, upon the whole, my favourite black grape. There should be one vine of Ingram's Prolific Muscat (fig. 360). This grape is good and high-flavoured when it has somewhat shrivelled, but not before. It is so prolific that at least three-fourths of the branches should be cut off the moment they appear. This variety has not been much approved, and is again going out

[1] All figures of grapes are drawn one-fifth the natural diameter.

of cultivation. It has the peculiarity of having many seeds. One vine should be grown of the Chasselas Musqué (fig. 361), which when fine is one of the best of all grapes; sometimes, however, it splits and rots, but sometimes we have had every berry perfect. There is no known method of preventing this mischief, otherwise the grape would be extensively grown. One vine may be grown of the Frontignan (fig. 362), which, although a small grape and consequently unpleasing to most grape-growers, is a good grape when not over-cropped; but

FIG. 360.—Ingram's Prolific Muscat.

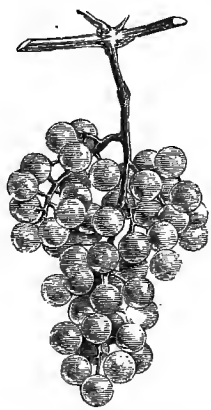


FIG. 361.—Chasselas Musqué.

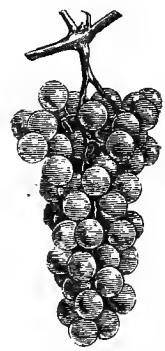


FIG. 362.—White Frontignan.

a grape called Standish's Citronelle (fig. 363) has been lately introduced, of such surpassing excellence that it will doubtless take its place. We have had it before the fruit committee of the Horticultural Society, where it received the highest commendation. One vine may be grown of Buckland's Sweetwater (fig. 364), which produces large bunches with enormous berries, with a thin watery juice, very refreshing on a hot day of September. One vine may be grown of Snow's Muscat Hamburgh. The berries of this are apt to shrink, but the fruit when in good order is delicious. With regard to late grapes, there is nothing to compare with Lady Downe's Seedling (fig. 365). The vine breaks later than any other, and when the grape is ripe it keeps later than any other. The figure is from a bunch which was ripe at the end of August, and which was preserved in a bottle of water till the first week of June, when the berries were still found

to be good. Such a number of trees of Lady Downe's should be grown as will be equal to the demand for late grapes.

One more late grape is good, West's St. Peter's, which yields fruit superior in quality to Lady Downe's Seedling in some years, but it is uncertain.

Barbarossa is another late grape, having enormous bunches. I have never grown it, and those which I have tasted have been poor in flavour: the vine is also a bad bearer.

A new grape of great beauty of form and large size has been

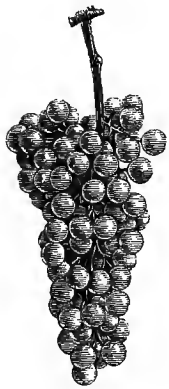


FIG. 363.—Standish's Citronelle.

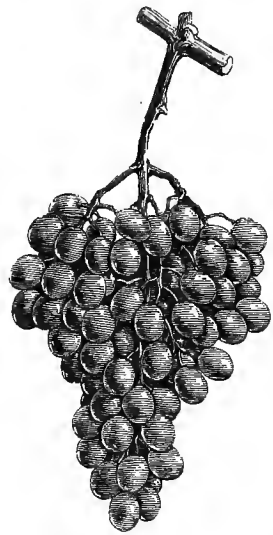


FIG. 364.—Buckland's Sweetwater.

FIG. 365.—Lady Downe.

raised by Mr. Paul, which he calls the Waltham Seedling (fig. 366), and which appears robust in habit. It is too new a variety to speak with any great confidence of its merits, but it has much to commend it to our attention.

The Raisin de Calabre and Golden Hamburgh we grow, but intend to discard; and the Muscat St. Laurent we used to grow, but do not now. It was a good grape, but not to be compared with Standish's Citronelle.

The French have the highest opinion of the Chasselas of Fontainebleau. It is a white grape with thin skin, but probably a great part

sold in Paris do not grow at Fontainebleau, but further south; for when there has been an abundant supply quite ripe at Paris, there have been none ripe at Fontainebleau when I have paid that place a visit.

Colonel Sykes introduced some kinds of grapes from the Deccan in India, one of which is a very remarkable grape, called the Black Monnukka (fig. 367), which deserves general cultivation. The bunches attain eight or nine pounds in weight, and the berries are stoneless.

FIG. 366.—Waltham Seedling.

FIG. 367.—Black Monnukka.

Mr. Barron, the superintendent of the Horticultural Society, called my attention to its value, and he pointed out its stoneless character, which rendered it a valuable grape to be used in confectionery: this grape I shall certainly grow.

We have on trial a General de la Marmora in a Looker's vinery, but no doubt a Poor Man's House is far better than a contrivance of this kind. There is no doubt that grapes may be obtained in any kind of long, narrow frames. A narrow wooden frame with the ground raised on each side would be the most convenient arrangement.

We grow several Muscat grapes, such as the Muscat of Alexandria (fig. 368), Canon Hall Muscat, Bowood Muscat, Tottenham Park Muscat. The two first are the most to be commended, but they demand a house for themselves, with greater heat and separate treatment. The Canon Hall Muscat yields very large berries, but has a bad trick of not setting its fruit well. I have tried to set it by rubbing the pollen of Black Hamburgh grapes over the flowers, but it is difficult to tell whether the process was really beneficial.

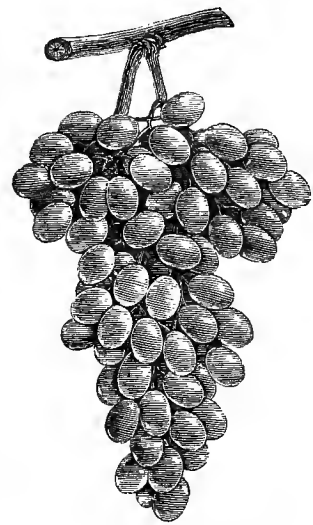


FIG. 368.—Muscat of Alexandria.

The list of grapes which has been detailed is perhaps the best selection which can be made for cultivation in a private garden.

We always get abundance from July till the end of February, and our treatment is sufficiently simple.

When the vines break in spring, the attention of the gardener is required. It is necessary then to attend to the hygrometric condition of the air by supplying large quantities of aqueous vapours; this is done by iron tanks which are placed upon the hot-water pipes, and rapidly evaporate. Some gardeners syringe their houses, but I think that a mistake, as the proper amount of moisture can be obtained without syringing. If syringing is practised at all, the wall and paths of the house may be syringed, but not the plants.

At this stage of growth a draught is as fatal as it would be to a new-born child, or to an elderly person, but, nevertheless, vines should have abundance of air. This is best secured by the back ventilators, so that there may be an interchange of air without a current. It is a good plan to give a little artificial warmth every night rom the time the vines start till the grapes are gathered. Of course when cold weather sets in, a due amount of warmth must be maintained by night and by day, but, as I do not force, I am

only giving such instructions as may ensure grapes from July to the next spring.

As the vines break, wood sufficient to cover the glass completely is left, and the shoots are kept stopped with the finger and thumb, so that every single leaf gets the full blaze of the sun and light upon it: every leaf which is shaded from the light is a damage to the vine instead of a support.

During the period of growth, the eye of the gardener must be vigilant to perceive oïdium; and if he even suspect it, the pipes should be dusted with the flour of sulphur, and this may even be sprinkled over the vines.

As soon as the young grapes develop themselves, the gardener must immediately prevent an undue number of bunches, and in this he must be guided by the size and age of the vines, remembering that it is a better fault to have a few fine grapes than many which are spoilt and uneatable.

But the gardener must carry his operations one stage further: he must thin each bunch, and, as a rule, two-thirds of all which are produced should be removed. This should be done as early as possible, before the young grapes exhaust the vine.

The moment the grapes begin to colour a drier state of air should be commenced. We empty every day or two one of our iron troughs, so that by degrees we obtain a drier atmosphere, in which the grapes attain the highest perfection and obtain a condition of skin which makes them keep better. When the grapes are quite ripe the gardener, if he wants them for his master's use, must take care that wasps, mice, and birds do not devour them before they are gathered.

When the grapes are cut, the care of the gardener is not at an end; the leaves must be protected till the vine is thoroughly ripened, and till they drop of their own accord. One year I was furious because a gardener I then employed tidied up the house, as he was pleased to call it, and pulled off all the leaves: this little indiscretion cost me two-thirds of the next year's crop of grapes.

As soon as the wood is ripened, the vines may be pruned. I cut

them back to a single rod, but I take care that each branch is cut back as near to the stem as possible, leaving one plump eye, for in this eye is the germ of the future shoot, and the bunch of grapes for next year. During the winter some gardeners delight in scraping the bark and painting the rods with various compounds of sulphur, soft soap, and lime. This rough treatment does much injury to the vine, but no damage can be done by dusting over the rods with flour of sulphur.

These instructions are simple, and are almost invariably successful when actually practised; but if the gardener varies them ever so little, a want of success will attend his efforts. Let the gardener lower the temperature at night, expose the young wood to cold draughts, leave overcrowded wood, too many bunches of grapes, or the bunches unthinned,—let him keep the atmosphere too dry, or make the air, while the grapes are ripening, too wet,—let him neglect the mildew for a few days,—and all the labour which he does spend will be labour lost.

The grape contains much potash, which shows itself in the tartrate of potash which is deposited in wine; it also contains much phosphorus: hence it is necessary to supply these materials to the soil Bone dust or ivory dust should be sprinkled over the surface, to be washed into the ground during the rainy season. The burnt tops of trees should be applied, but above all a good supply of stable dung should be yearly given to the vine border. It is true that when a vine gets into congenial soil no manure is required. The vast vine at Hampton Court neither receives nor does it appear to require manure, yet the vine-growers up the Rhine give their vines manure, and our vines ripening their fruit in houses are improved by an annual dressing of stable dung.

We follow what is called the Rod system, but this is not necessary, as one vine can be made to cover almost any reasonable space Nevertheless a large vine takes a long time to grow, and thus a number of rods are, upon the whole, more convenient for the horticulturist, who desires quickly to obtain his produce.

Much attention has been given lately to preserve grapes after they are cut. By removing the bunch with a branch and by placing the end of the branch in a bottle of water in a dark room, grapes cut in October will last till June. In Italy they have grapes of the preceding year as late as the month of May, but then the grapes appear to be kept in baskets, and the stalks are withered and dried up, and they certainly are not much to be commended.

Grape vines are propagated by pips, by which new varieties are raised. To obtain new sorts the flower of one kind is sometimes set with the pollen of a second: in this way Standish's fine new grape was raised; in this way Snow's Muscat Hamburgh was raised. Probably, however, new kinds come mostly from the pips of former choice varieties. Any variety may be propagated by cuttings, or from a single bud with about half an inch of old wood: this is placed in a pot, covered with earth, and kept in a warm house. It may also be propagated by a young shoot torn out of the axil of a leaf and placed in a pot. The propagation by a single eye is the favourite plan; and if planted in heat in January and grown rapidly, it makes a large vine before the end of the year.

Any variety of vine may be propagated by layers or by circumvallation, as the vine roots freely from any part of its shoots. It even throws out roots spontaneously, under certain circumstances, into the house, but I never could determine exactly what the conditions are, which induce this phenomenon. Sometimes these roots have been apparently traced to pressure on one part of the vines, but at other times no assignable reason could be given.

Vines may be grafted, when we desire to change an established vine to one of another character; or they may be inarched. Thompson recommends whip-grafting for vines. Grafting and inarching must be practised in spring, just as the vines are starting, and the shoots will make a growth of ten or twelve feet in a single season. I have seen both processes adopted with perfect success.

Our vines laden with their grapes are beautiful in autumn. The turf-house, with its depending branches, is ever to be remembered when

once it has been seen, showing, as it does, what good results may be obtained by such simple means.

"Arch'd over head with an embracing Vine,
Whose Bunches, hanging down, seem'd to entice
All passers by to taste their lushious Wine.
And did themselves into their Hands incline,
As freely offering to be gathered :
Some deep empurpled as the Hyacint,
Some as the Rubin, laughing, sweetly red,
Some like fair Emeraudes, not yet well ripened."—SPENSER.

MELONS.

Our Melons (*Cucumis Melo*) are always objects of particular culture, and one or two hundred pounds' weight are grown in a favourable season. The seed of the first crop is raised in March in the cucumber-house, and is planted in April, when the fruit is obtained in June and July. These are grown in the tank melon-pit, already described (fig. 96). Other crops are planted in the cold frames, as they can be spared, for they are not otherwise required after the new potatoes and early strawberries are finished. A few barrow-loads of hot dung are used along the centre of the frames to start the plants. To obtain success with melons they should be planted in rich top spit loam. When the flowers appear and when the plants have attained considerable growth, the female flower should be set by hand; for, although the hives are close at hand, the bees visit the frames very sparingly. We leave no more leaves on the plant than can be thoroughly sunned and aërated. When the fruit is set and is fairly swelling, little or no water is given, for water has the curious effect—as I have ascertained by the experiment of allowing the roots of a melon to grow in a pan of water—of causing the fruit to be arge but hollow in the centre, whereas if water is withheld the fruit is solid to the centre, and much finer in quality.

To obtain flavour it is necessary that the leaves of the plant should preserve their integrity till the fruit is ripened, which may be effected by preserving the moisture of the atmosphere by saucers of water. The fruit should not be cut till quite ripe, and ought to be eaten immediately

afterwards: then it is wholesome. Sometimes we are terribly troubled with the melon aphis, which appears by thousands, and which causes the roots to rot. In July we usually get a visitation of one species of red spider, but a moist atmosphere at night generally kills it. During the month of July, but not before nor after, the growth of melons is difficult at my garden on account of this pest.

The varieties of melons are innumerable. Many prefer a green-fleshed melon, such as the Golden Perfection or the Orion. I give a preference myself to a netted melon with thin skin and pink flesh (fig. 369), such as Williams's Paradise Gem. Turner's Gem is a nice melon, but it has a tendency to crack, and then it becomes infected with fungus and is unwholesome. The Beechwood and Bromham Hall are also fine melons. There is a little melon called Queen Anne's Pocket Melon. I generally grow several varieties every year, and save the seed of any one which proves particularly excellent. The white-fleshed melons are not agreeable to me, or much less so than the green or pink-fleshed ones. The character of melons, probably from being seedlings, is constantly changing; the melon with a certain name to-day was not the same some years back, and will not be the same some years hence; so that, in choosing varieties, horticulturists must be guided from time to time by the kinds of seed which are obtainable. In my tank melon-pit, after the first crop was cut, a moderate amount of water was given to the plants, which started them into fresh growth, and gave a second crop of large fine melons.

FIG. 369.—Scarlet Melon, ⅓ diam.

No melon has been produced out of doors at my garden, and I have failed, even in a frame, in growing the water-melon of South Europe.

I strongly recommend growers of melons to use them before they get fungus; and in times of cholera, if they cannot be obtained in a growing state from healthy plants, to cast them away.

"Like melons, friends are to be found in plenty,
Of which not even one is good in twenty."

NUTS.

Several kinds of Nuts (*Corylus Avellana*) have been planted at Wallington, but nothing in comparison with the long list published by Mr. Webb of Calcot near Reading, who has made nuts an object of special study. Varieties are raised from seed and selected for their superior qualities, and are propagated by grafting on the common hazel, or by planting suckers from the improved kind. Rivers, always on the watch for improvements, has grafted many kinds on the tree-nut, the *Corylus arborescens*. In 1870 his grafted trees were wonderfully fruitful, but that season was an abundant year for nuts; therefore the question cannot be considered as settled from that experience. At my garden we grow the Red Filbert (fig. 370), the envelope of the kernel

FIG. 370.—Red Filbert.[1]

FIG. 371.—Cosford Nut.

FIG. 372.—Cob Nut.

of which is covered with a red membrane. It is a nut of the highest flavour, but it is a bad bearer. Again, we grow the Purple Filbert, the colour of the leaves of the trees being that of the leaves of the copper-coloured beech, or even darker. The tree itself is a great ornament, and the nuts produced are fairly good. This variety should only be grown for the ornamental foliage. The Cosford (fig. 371) has a very thin shell; it ripens early, and, to my mind, it is one of the most excellent of nuts; in fact, it is my favourite. The White Filbert is good, and the Atlas bears in immense clusters.

The Kentish Cob (fig. 372) is large, with a full kernel. This nut is the most valuable for spring use, and with care will last more than a year.

FIG. 373.—Nut, Male and Female flowers.

All nuts have blossoms (fig. 373), of which the male

[1] All the figures of nuts are drawn one-half of their diameter.

blossom is a catkin and the female a little red flower. They bear no spurs like currant-trees, and in Kent the bushes are carefully thinned, so that light and air are admitted to every branch, but the little bearing spurs are carefully preserved. Varieties which are called nuts have their husk as long as, or not longer than, the enclosed nut; filberts have their husk longer than the nut. It is desirable to have trees of all the sorts which are here mentioned, but I am uncertain how far other new varieties can be commended.

WALNUTS.

Our district has been celebrated for its Walnuts (*Juglans regia*, fig. 374) for many years. Carshalton Park abounds in fine walnut-trees. Beddington Park and its estate had several, but many of these have been cut down recently. We have one large walnut-tree, and also small trees of the Dwarf Prolific, but they grow too rapidly with us to get much produce every year, and besides we suffer from spring frosts. Walnuts are mostly raised from seed, but superior varieties are multiplied by inarching. There is one kind, called the Walnut of St. Jean, that does not put forth its leaves till June, and thus escapes all spring frosts.

FIG. 374. Walnut.

CHESTNUTS.

We only grow one Sweet Chestnut-tree (*Castanea vesca*, fig. 375), nor do I know of many trees in the district. There is a considerable difference in the fertility of varieties, and also in the quality of their produce. They do not every year come to perfection in this country. The Devonshire Prolific and Downton are reputed the best kinds.

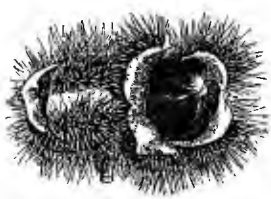


FIG. 375.—Sweet Chestnut, ⅓ diam.

Chestnut-trees are largely grown in Italy, and the rotten wood is used exclusively in the South of France and in Italy as a material in which the camellia, azalea, and rhododendron are grown.

ALMONDS.

Almond-trees (*Amygdalus communis*, fig. 376) are hardly grown in this country otherwise than for ornament, on account of the remarkable beauty of their flower, which is one of the earliest of all the spring blossoms.

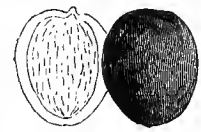


FIG. 376.—Almond and section, ⅓ diam.

The French nurserymen's catalogues describe many varieties, and the flavour of the produce of all my trees varies, but I have no faith in the names which have been assigned to them.

I have observed that it is essential to have the wood of the tree well ripened for it to have much flower. Even with abundance of flower we have seldom any great amount of fruit.

In 1870 the almond-trees round London, including mine at Wallington, were laden with fruit. We adopted the foreign plan of commencing to use them for dessert as soon as the kernels were formed, and we had abundance of fruit till winter. Our friends from France considered them a great delicacy. Why there was so great a crop in so bad a spring season was a puzzle to me, but as I was in Italy that spring I could not unravel it. In Florence I bought in the market green almonds as early as the middle of April, but where they came from I could not learn, but probably either from Sicily or Africa, as fruit of the Loquat was sold at the same time. When almond-trees do fruit in England, the produce is generally neglected, but, from the manner in which they were appreciated in 1870, the culture of this fruit certainly deserves more attention, especially as the tree is most ornamental in early spring, even if it produces no fruit. In our village there is a fine almond-tree overhanging the road in the garden of Mr. Mackenzie.

ORANGES AND LEMONS.

The varieties of Oranges (*Citrus aurantium*) are very numerous, but they can hardly be said to be grown for fruit here, nor is it advisable, when steamers bring oranges so rapidly from the South, where the trees

flourish. I only grow one or two trees for the blossom (fig. 377), which is the glory of bridal wreaths. We have a small Lemon-tree (*C. Limonum*), and, really, this may be grown more frequently where there is room, for even in Italy as far south as Florence I observed that the lemon-trees were protected in all the private gardens during winter and up to the month of May. Varieties of oranges are raised from pips: though trees may be freely raised in this way, they require to be grafted from approved sorts to have eatable fruit, as not one in a thousand seedlings may turn out good. Oranges may be propagated by grafting or by circumvallation. The blossom of the Otaheite Orange has a peculiar odour, which differs from the common orange. I have already mentioned that in Sir Walter Raleigh's time 10,000 of this fruit were grown in a single year at Beddington Park but it is doubtful whether its cultivation for its fruit is now desirable in England.

FIG 377.— Orange blossom.

THE CUSTARD APPLE.

Amongst curious fruits, I have tried to raise seeds from the delicious Custard Apple (*Anona*), which every winter is brought to Covent Garden Market. The seeds have grown only this year. Mr. Rivers has a tree, but it has not yet fruited.

FIGS.

FIG. 378.—Fig, ½ diam.

The green Fig (*Ficus Carica*, fig. 378) is a delicious fruit, of which there are endless varieties: some are very small, as the White Ischia; others very large, as the Figue d'Or. Mr. Rivers has eighty-nine varieties in his catalogue. I have had many kinds, which did well in the back of my vinery till the vines grew; the figs then ceased to bear, and were removed, because the exhalations of the foliage of the

fig were not good for the grapes. In the vinery I found Brown Turkey, or Lee's Perpetual, excellent; White Ischia, though small, delicious; White Marseilles, most luscious; Early Violet, small but good. Upon the whole, I recommend for orchard-house cultivation Lee's Perpetual: this is now grown with me in the orchard-house, and yields fine crops of its excellent fruit. The tree is trained under the glass, and gives very little trouble; the only thing is to afford it plenty of light. Up to this time I have never had a fig from an outdoor tree, although they grow in great abundance on standards at Worthing in Sussex. The best outdoor fig is the Black Brunswick, although it is reputed not to force well, and I have planted a small tree of this in a dry and warm part of the garden, in the hope that it will gradually grow and bear fruit, as the old standard trees do at Worthing. The propagation of the fig is very simple; every little sucker, every cutting will grow, and it may be freely multiplied by the process of circumvallation.

THE MULBERRY.

"Ille salubres
Æstates peraget, qui nigris prandia moris
Finiet, ante gravem quæ legerit arbore solem."
HORACE, *Satira* iv. lib. ii.

Every garden used to have its Mulberry-tree (*Morus nigra*): no one, however, now plants a mulberry-tree. If our forefathers had not done more for us than we are doing for our posterity, we should have been utterly deprived of this delicious fruit. I have a mulberry-tree in my orchard-house, where the fruit really ripens. Mr. Rivers tells me that his orchard-house mulberries (fig. 379) are large; mine, however, have been small, but so sweet and delicious as to be like another kind of fruit. I recommend everyone who has an orchard-house to have a pot mulberry-tree: they will be no less astonished than gratified by the excellent quality of the fruit.

FIG. 379.—Mulberry, ½ diam.

THE PRICKLY PEAR.

The Prickly Pear (fig. 380) is the fruit of the *Opuntia*, but the fruit of many Cacti is equally good; in particular, I may mention that of *Cactus speciosissimus*, which I have often gathered and eaten in the months of March and April, when their red flesh is really delicious. I have plants of the *Opuntia Rafflesquiana* (fig. 381), which is reputed to be perfectly hardy. It stood the winter of 1870 in my neighbourhood, when the temperature fell to zero. This plant must be carefully watched, as if it thrives in this country it will give a fruit of a totally different character from that which we have before had.

FIG. 380.—Prickly Pear.

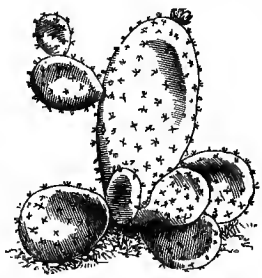


FIG. 381.—Opuntia Rafflesquiana.

ERYOBOTRYA JAPONICA, ANASPOLE JAPONICA, OR LOQUAT.

At my garden there is one tree of this species, which was given to me by Sir James Tyler; its fruit (fig. 382) is much esteemed throughout South Europe. My tree has not borne fruit as yet. At Florence, Naples, and Rome it is used for decorative purposes, from its noble foliage. I have bought fruit in the market at Florence in April, have occasionally met with it in the shops of Covent Garden Market, and have known it to be sold by costermongers in the City of London. Its taste does not commend itself, in my opinion, to the extent to which some persons who have travelled abroad appreciate it. I have tasted fruit shown at the Fruit Committee of the Horticultural Society from English hot-houses.

FIG. 382.—Loquat.

THE BANANA.

One kind only of Banana, the *Musa Cavendishii* (fig. 383), is grown at my garden, but it has not yet fruited. This dwarf variety is the easiest to fruit in this country, and I have seen it in great perfection at Peterborough House, Fulham, and at other places. One fruit was shown lately by Mr. Sage, at the Horticultural Society, weighing 46 lbs. The plant likes bottom heat and rich soil. I have tasted in this country the produce of the Abyssinian Banana, now so much praised for the beauty of its leaves, both here and in Paris. Fine specimens of the fruit have been grown by Mr. Cunliffe at Coulsdon. My plant is grown in my vinery, which is evidently not sufficiently warm for it.

FIG. 383.—Banana.

FIG. 384.—Passion-flower Fruit, ½ diam.

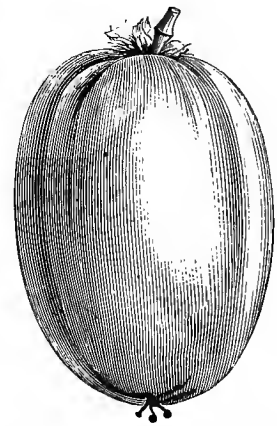


FIG. 385.—Passiflora macrocarpa, ⅓ diam.

THE EDIBLE PASSION-FLOWER.

I grow the *Passiflora edulis* (fig. 384) in my fernery, where it fruits. The fruit is about as big as a hen's egg, and hard outside. The seeds are enclosed in a pulpy mass, which has a delicious flavour, and is much enjoyed by West Indians. This plant can evidently be readily grown in any warm house. There is another passion-flower which yields enormous fruit, but it has not fruited with me, the *Passiflora macrocarpa* (fig. 385), the pulp of which is also excellent.

THE POMEGRANATE.

FIG. 386.—Pomegranate, ½ diam.

In this country the Pomegranate (*Punica Granatum*) is grown for its flower, and not for its fruit. The first time I saw it on the tree, at Cette, it greatly delighted me. The juice is particularly refreshing, especially at times when the stomach cannot bear the pulp of other fruits, as, for instance, after an attack of typhoid fever. Its large conspicuous fruit (fig. 386) is very interesting, and leads us to exclaim with Thomson—

"Nor, on its slender twigs
Low bending, be the full pomegranate scorned."

EUGENIA UGNI.

I planted many trees of the *Eugenia ugni* (fig. 387), which was said to be hardy. However, every tree out of doors died. Those which were protected yielded small berries of a pleasant odour and somewhat of a turpentine taste. The general verdict of those who have tasted the fruit is rather against than for it, and in fact it has gone out of cultivation. It may be propagated by seeds, and probably by cuttings, which I have never tried. The late Sir W. Dilke took great pains to bring this fruit into general use.

FIG. 387. Eugenia ugni.

THE CAPE GOOSEBERRY.

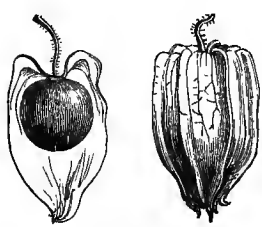


FIG. 388.—Cape Gooseberry.

The Cape Gooseberry (*Physalis edulis*, fig. 388) is another unimportant plant, the fruit of which some people like. It may be easily grown out of doors or in the orchard-house during summer, or in the greenhouse during winter, and gives abundant fruit. It may readily be raised from seed and propagated by cuttings.

THE CRANBERRY.

I have made great efforts to grow both the American and English Cranberry (*Oxycoccus*), with very limited success, and I have pursued

my experiments over several years. The American Cranberry (fig. 389) is grown satisfactorily at Hastings; and at one place, by arranging a platform over a river, and occasionally flooding the plants. If the plants are too wet they do not flourish, and if they are too dry they do not succeed. Their growth was recommended by Sir Joseph Banks. Not despairing of ultimate success, I made three other plantations in 1871. I am afraid the cold temperature of our winter is a great difficulty. They require peat soil. Up to this time I have not had a single dish from their produce, and all my labour has been lost.

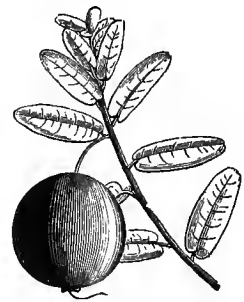


FIG. 389.—American Cranberry.

"It were long,
Too long, to tell th' expedients and the shifts,
Which he that fights * * *
Devises, while he guards his tender trust;
And oft at last in vain."—COWPER.

THE CLOUDBERRY.

There are two allied species of Cloudberries, the *Rubus arcticus* and *Rubus Chamæmorus* (fig. 390), which have been planted. The first lives, but has not done well. Dr. Fergus, who recently visited Norway, was so kind as to procure me a large number of roots of the Norway Cloudberry, which has an historical interest, having been eaten by Linnæus when suffering from fever. I have made a deep plantation of peat, and over this I have planted the roots in cocoa-nut refuse, but my plants are getting on very badly. The figure is taken from a specimen Dr. Fergus brought over. I have since found the plants on the mountains on Don Side, and heard of it in other localities in Scotland. It is worthy of an attempt to naturalize it in our gardens.

FIG. 390.—Cloudberry (Rubus Chamæmorus).

WHORTLEBERRIES.

Whortleberries (*Vaccinium Myrtillus*) come up spontaneously in the peat in my ferneries, but if they bear fruit the birds get it.

DEWBERRIES.

The extreme beauty of the Dewberry (*Rubus cæsius*, fig. 390*a*), as it grows freely on the banks of the Lea and of the Thames,—especially when the fruit is covered with its exquisite bloom,—makes me think it ought to be cultivated where ground can be spared.

BERBERRIES.

We grow the Berberry (*Berberis vulgaris*, fig. 391), which makes delicious preserves. Oddly enough, it blossoms well, but it hardly ever sets its fruit, so that I very seldom get a crop.

FIG. 390*a*.—Dewberry.

FIG. 391.—Berberry.

FIG. 392.—Elderberry.

THE ELDERBERRY.

We have three varieties of Elderberries (*Sambucus*),—the white, the black, and the scarlet. The black (*S. nigra*) is the more common, and is generally used for wine—which, when mulled, is no bad drink on a cold day, whilst carrying out the winter garden works; I often use it with strips of toast, and the latter my robin always comes to share with me. The white elderberry I have never tried for wine, but I shall attempt it the first time I can get enough fruit. There is a scarlet elderberry (*S. racemosa*, fig. 392), but it has not yet fruited at my garden, although I have observed it to be a common plant in Scotland. One pretty standard flourishes in front of the Trossachs Hotel.

THE STONEBERRY.

I am trying to grow the Stoneberry (*Rubus saxatilis*), which is a rare plant in England, but which is found occasionally in Scotland. I have brought a number of plants from Scotland to ascertain whether they can be rendered worthy of cultivation, but experience only can decide the fact. They are growing freely.

PINE-APPLES.

We do not profess to grow Pine-apples (*Bromelia Ananus*); nevertheless by a little management we contrive to have a few of fine flavour every year, by appropriating to their culture a frame with a flue and return hot-water pipe. They like warm bottom heat, a humid atmosphere, and abundance of light; they are propagated by seed when new varieties are sought, but for the usual growth they are multiplied either by planting the crown or by suckers. We now plant suckers in pots in the back of the melon-pit in spring: these root during the summer, when they are in autumn removed to the small brick pit. By management some gardeners obtain the largest-sized pines within a year of planting the suckers; but we have never succeeded in so short a period. During winter but little water is given, but, as spring commences, the tan-pit is made up, and they are grown more rapidly. They require but little care or trouble, except to maintain the temperature of the pit so that it does not fall much below 70°, and to keep the air moist.

Fig. 393.—Queen Pine-apple.

There are various kinds of pines, but one variety from its keen penetrating flavour surpasses all,—namely, the Queen (fig. 393). Perhaps one pound of good Queen pine would go as far in flavouring ices as half-a-dozen pounds of any other sort. Where large pines are required, Providence or Trinidad pines must be

grown, and for winter use the Black Jamaica is recommended. The best soil for them is a mixture of top spit loam, peat, and horse-droppings, with a little sand. The plant should always be grown close to the glass. The blossom of the pine is interesting, as it flowers at each little compartment, beginning from the bottom and continuing till it reaches the crown (fig. 394).

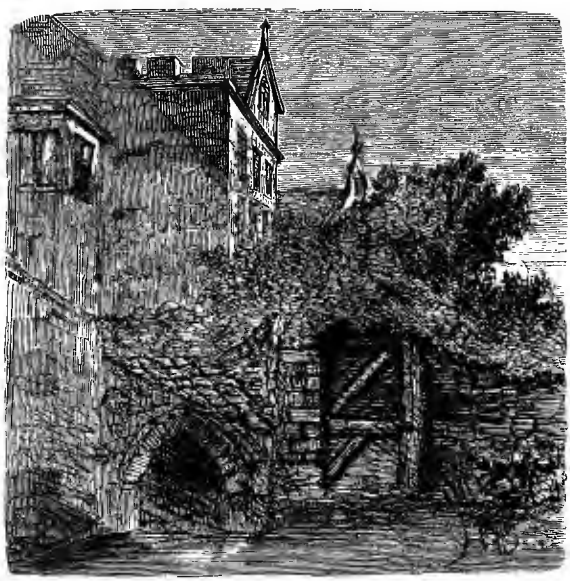
FIG. 394.—Pine-apple in flower.

At the present time there is a great scarcity of good fruits, and it would be highly desirable that a far larger quantity should be supplied to the large towns of England. Many gentlemen overworked with the arduous duties of life would find relaxation and pleasure in their leisure hours in planting orchards, in superintending the cultivation of their trees, and in the production of fruit. But the residents of large towns cannot buy, neither can the producers sell, as both parties are entirely in the hands of the middle man. The barrister, the physician, and the merchant can apply their intelligence to the growth of fruit, but cannot and will not attend to the sale of it. An improved system of public market is required, which demands the careful and immediate attention of the Legislature, that the people may be fairly supplied with the fruits of the market. The learned antiquary, Mr. Charles Roach Smith, has called attention in a pamphlet to the scarcity of fruit, and I hope that the details which have been given of my experience will tend to diminish the want. At the present time tens of thousands of a few kinds only of fruit-trees might be grown with great advantage to the crowded population of our large overgrown cities. I will name six constantly bearing fruit-trees, the produce of which would be a gain to every householder in the country,—be he rich or be he poor: Apples, Lord Suffield and Wellington; Pears, Louise Bonne for eating and Catillac for baking; Plums, Gisborne and Rochester Cluster Damson.

In concluding my remarks on fruit-trees, I must again observe, that much is owing to art, little to the soil. My garden was selected

for qualities other than that of pomological excellence, and it may be said of it,—

"Leur maigre terrain,
Qui suffisait à peine à l'humble romarin,
Vit naître à force d'art, sur sa côte brûlante,
Le melon savoureux, la figue succulente,
Et ces raisins ambrés qui parfument les airs ;
Et l'arbre aux pommes d'or, aux rameaux toujours verts."



Vign. XIX.—View of Beddington Hall, near the Church.

Vign. XX.—New Bridge in Beddington Park.

CHAPTER X.

GENERAL FLOWER GARDEN.

"In all places, then, and in all seasons,
Flowers expand their light and soul-like wings;
Teaching us, by most persuasive reasons,
How akin they are to human things."—LONGFELLOW.

WE grow in the garden many kinds of flowers, and select as many species of as many classes as we can obtain at a moderate cost; so that in each season, as far as climate may permit, we have some blossoms to gladden our eyes with their perfect forms or brilliant colours. In the general flower-garden we cultivate Bulbous plants, so beautiful in early spring; Perennial plants, so useful because they remain from year to year without renewal; Bedding plants, by which we secure masses of bright flowers between June and October; Annual flowers, which come up in spring, blossom, and perish after they have seeded; Biennial plants, which grow one year and flower the second; Greenhouse plants, which require protection from frost, and which give us flowers when the winter's blast has stopped outdoor growth; Hothouse plants, which require tropical temperature, both in winter and summer, for their successful culture. Besides, we have rosaries, alpineries, ferneries, and orchid beds, for the special cultivation of particular classes of plants.

BULBOUS PLANTS.

The first flower which appears in early spring, and delights us after the rest of plants during winter, is the Snowdrop (*Galanthus nivalis*,

fig. 395). It is constant as to the time of its appearance in the third week in January, and shows its drooping head immediately after the snow melts. In one year, however, and in one year only, the snowdrops appeared between Christmas and New Year's day.

FIG. 395.—Snowdrop.

Snowdrops are naturally single, but double ones have been obtained by cultivation. It is only necessary to plant the bulbs and then to leave them alone, when the bulbs multiply year after year. Quantities of snowdrops should be grown, as they light up the bare ground in the ferneries, before the fronds spring forth.

The double variety of snowdrop is somewhat larger than the single, but of the two I rather prefer the single, as being upon the whole more pleasing to the eye.

A larger species of snowdrop (*Galanthus plicatus*) has been lately introduced from the Crimea. The flower is somewhat larger, but the leaves are much broader and coarser. It is scarcer than the common species, and differs so little from it as hardly to be recognized without close examination. Except as a mere curiosity it is a worthless addition to the garden.

> "And in yon mingled wilderness of flowers
> Fair-handed Spring unbosoms every grace:
> Throws out the snowdrop and the crocus first."
>
> THOMSON'S *Seasons.*

Before the snowdrops have disappeared Crocuses come forth in many varieties. The *Crocus versicolor* is the first; quickly succeeding to this are the large yellow, white, and blue varieties of *C. vernus* (fig. 396). The bulbs last for years if planted in a dry place, and if a little manure be yearly spread over the surface. The ground dries and the bulbs ripen in the summer, but, when the autumn rains moisten the ground they grow, and in spring send forth their gorgeous flowers. Nothing can exceed

FIG. 396.—Crocus vernus.

the effect of thousands of crocus flowers in blossom at one time. Crocuses are apt to be destroyed by mice, but I have found that early planting is a partial preventive.

> "Crocus, and hyacinth, with rich inlay,
> 'Broider'd the ground, more coloured than with stone
> Of costliest emblem."—MILTON.

The crocuses hardly disappear before Hyacinths (*Hyacinthus orientalis*, fig. 397) blossom. These may be grown in the same way as crocuses. For out of doors it is better to use the pot hyacinths of the previous year, which flower with me, if left alone, many years. We grow our pot hyacinths in a particular manner. They are planted in a compost of loam, manure, and sand, and then all the pots are placed together and covered with earth. This imitates their natural condition; for when they are well rooted, and the crown has risen about an inch from the bulb—which in my soil takes place about Christmas—they are taken out. A few have their blossom hastened by heat, while others are placed in the orchard-house and blossom with the peach and nectarine trees, making altogether a brilliant display. Directly the flowers die down the bulb is turned out of the pot and transplanted to the border, where it remains permanently, and will last for years if not disturbed. Those who desire to grow hyacinths to show the highest perfection of cultivation, use a pot much deeper than usual, to enable the roots to strike down; but this is quite unnecessary for general gardens. Hyacinths are in the wild state naturally blue and single, but florists' flowers are single and double, and are of all shades of red, white, and blue, and some are yellow. The latter colour, however, seems to be a greater deviation from the natural flower, and the bulb which produces it is more delicate. It is usual for the finest specimens which are shown at botanical gardens to be returned to Holland, for the Dutch gardeners to get the bulbs into good condition before they are again shown. Bulbs stored

FIG. 397.—Hyacinth.

in this country should be taken out of the pots and dried slowly in the shade, as the heat of the sun very much damages the bulb.

> "And the hyacinth, purple and white and blue,
> Which flung from its bells a sweet peal anew
> Of music so delicate, soft, and intense,
> It was felt like an odour within the sense."—SHELLEY.

Following the Hyacinth, the beautiful family of Narcissus blossoms, the varieties of which are invaluable for rendering the garden brilliant till the bedding plants are placed out of doors. Mr. Barr has studied these, and shown at the Horticultural Society numerous varieties. The *Narcissus minor* from the Pyrenees is interesting from its very dwarf habit, not three inches high. The *Narcissus Bulbocodium*

FIG. 398.—Corbularia conspicua = Narcissus Bulbocodium.

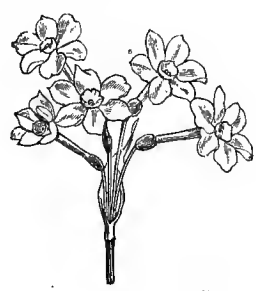


FIG. 399.—N. Jonquilla.

FIG. 400.—N. maximus.

(fig. 398), or Hoop Petticoat Daffodil, is a beautiful kind. There are other specimens of daffodil which grow naturally in our fields.

> "Daffodils,
> Which come before the swallow dares, and take
> The winds of March with beauty."—SHAKSPEARE.

The Jonquil (*Narcissus Jonquilla*, fig. 399) is deliciously scented. There are many florists' varieties, which may be grown in pots one year, and then planted out in the open border. They appear to deteriorate very little with me, but increase and produce a multitude of bulbs, each sending up splendid trusses of flowers.

N. juncifolius is a pretty dwarf species. *N. maximus* (fig. 400) has a noble flower, probably a variety of the common daffodil (*N. Pseudo-Narcissus*). *N. incomparabilis*, from Southern Europe

(fig. 401), is very distinct, and there is a double variety of great beauty. When the glorious *Narcissus poeticus* (fig. 402) comes into flower, at the end of May, we may know that summer is at hand. Whilst it lasts it is the glory of the garden, and many roots should be grown. Near the Lake Maggiore I saw a field literally covered with this Narcissus, and a grand sight it was. It multiplies very fast, and forms large patches if the gardener does not tidy up the border in winter and ruthlessly destroy the bulbs.

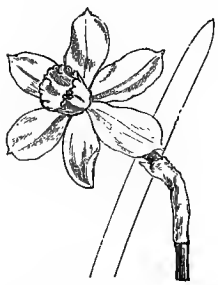


FIG. 401.—N. incomparabilis.

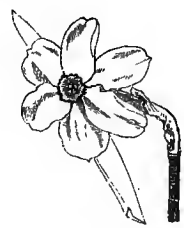


FIG 402.—N. poeticus.

FIG. 403.—N. Tazetta.

We also grow *Narcissus Tazetta* (fig. 403), with other species. Considering their importance in taking a place at a particular time of the year, and their easy culture, they demand more attention than they receive.

> "Then the pied wild-flowers, and the tulip tall,
> And narcissi, the fairest among them all,
> Who gaze on their eyes in the stream's recess
> Till they die of their own dear loveliness."—SHELLEY.

Between the general flower-garden and the ferneries the *Fritillaria meleagris* (fig. 404) should never be omitted. It is one of the wild flowers of England, of which there are many florists' varieties. The *F. meleagris* is not common in gardens, and I have been amused at many gardeners not even knowing what it was. It grows well with me, and seeds freely, and most of the varieties are beautiful. Allied to this is the Crown Imperial, which never does well, and, in my opinion, it may be dispensed with,—at any rate in any considerable quantity.

An early spring flower of great beauty, which very few grow, and yet which everyone admires, is the Spring Snow-flake (*Leucojum*

vernum, fig. 405); succeeding this, at a later period of the year, the Summer Snow-flake (*Leucojum æstivum*, fig. 406), of equal merit, takes

FIG. 404.—Fritillary.

FIG. 405.—Spring Snow-flake.

FIG. 406.—Summer Snow-flake.

its place. The grand secret of cultivation with these, as with other bulbs, is to plant them and then to leave them alone.

The Dog-tooth Violet (*Erythronium Dens canis*, fig. 407) is another pleasing early spring flower, from Southern Europe. It does not grow

FIG. 407.—Dog-tooth Violet.

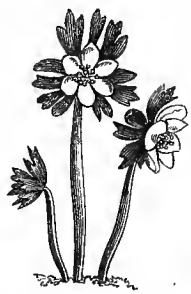


FIG. 408.—Winter Aconite.

FIG. 409.—Garden Anemone.

very well with me, but what interferes with it I do not know. It likes plenty of sand.

The Winter Aconite (fig. 408) may be sparingly used in shady places; it has a yellow flower early in spring: a small quantity only is grown in my garden.

There are many species of Anemone, which I restrict to my alpineries and wild gardens, but the varieties of *A. coronaria* (fig. 409) are flowers which give us colour in early spring, when the ground is otherwise bare. They have never done well with me, and perish in a year or two, although, at times, I have tried considerable quantities. Some of the florists' varieties are single and some double; and though

not equal to the natural wild flower, yet they are valuable additions to the flower-garden. One late anemone, the *A. vitifolia*, var. *Honorine Jobert* (fig. 410), which flowers in September and October, is so beautiful that it should be grown in every garden. Its charming foliage, and the freshness of its large pure white flower, appearing as it does when vegetation naturally takes its rest, make it a most desirable acquisition. It is one of the loveliest of all garden plants.

FIG. 410.—Anemone vitifolia.

FIG. 411.—Anemone hepatica.

FIG. 412.—Ranunculus.

Another early spring flower, the Hepatica (*Anemone hepatica*, fig. 411), a plant from Europe, is a very valuable acquisition in early spring. There are many varieties, single and double, red, blue, and white. The *Anemone angulosa* is a magnificent flower, more than an inch across; after that the double red is the most beautiful. When they will grow, all the varieties should be planted, but in my garden their cultivation is very difficult. The climate does not suit them; the leaves become diseased and the whole plant perishes; and up to this time I have been unable to establish a satisfactory plantation. They like good rich loam, which I give them, nevertheless they fail.

> "From the soft wing of vernal breezes shed,
> Anemonies; auriculas, enrich'd
> With shining meal o'er all their velvet leaves;
> And full ranunculus', of glowing red."
>
> THOMSON'S *Seasons*.

The florists' Ranunculus (*Ranunculus asiaticus*, fig. 412) is really fine, but it is troublesome to grow, and requires special treatment, and therefore is not adapted for a wild or general garden. The border anemones produce a fine effect in proper places. Except the wild

species, we have not much used them at my garden, nevertheless I much admire them.

I do not grow the florists' tulips (*Tulipa Gesneriana*), which require much trouble, and the cultivation of which is attended with considerable cost. I like to see a few Parrot tulips (fig. 413) in the borders, for their extraordinary colours and forms, which remind us of the

FIG. 413.—Parrot Tulip.

FIG. 414.—Common Garden Tulip.

FIG. 414*a*.—Single Van Thol Tulip.

gaudy plumage of macaws. Of the other border tulips (fig. 414) I have put in many, but they always disappear: what the destroyers are, I am unable to say. The single (fig. 414*a*) and double Van Thol tulips are very charming for pot culture, and are much used for table decoration in London and Paris.

Francis records in the "Chronicle and Characters of the Stock Exchange," that in 1634 the Tulipo-mania occurred in the chief cities of the Netherlands, by which the value of a flower was raised to more than its weight in gold; and that in one case "goods to the value of 2,500 florins were given for one root," and in another case "twelve acres of land were paid." "Contracts were made and thousands of florins paid for tulips which were never seen by broker, by buyer, or by seller." To this day the same mode of gambling in its most pernicious form is carried on at the Stock Exchange, on things of even less value than a single tulip bulb.

FIG. 415.—Dielytra spectabilis.

The *Dielytra spectabilis* (fig. 415) is a charming Chinese plant,

almost but not quite hardy. When grown in a greenhouse, it is very beautiful; but out of doors the frosts injure it, and make it appear a poor woe-begone plant.

About the end of May the Ixias (fig. 416) are most lovely flowers, but they are difficult to grow, because they are impatient of confinement and require protection. One year, when they were carefully looked after, my plants made a grand display. The secret of success is to give plenty of air, and yet protect the plants from frost. They will hardly live out of doors in the climate of my garden.

FIG. 416.—Ixia.

FIG. 417.—Iris.

FIG. 418.—Gladiolus.

In May, the Iris ("Iris of all hues") is a fine flower. The wild yellow species is beautiful beside our water, but there are numerous varieties of the *Iris germanica* (fig. 417), as well as of the English Iris and Spanish Iris: these I have grown besides those species which are gems for the alpinery, and which are described amongst the other alpine plants.

In autumn the last bulb of all, the blossom of which lights up the flower-border, is the glorious Gladiolus (fig. 418), of two or three species. A brilliant scarlet variety is the *Brenchleyensis*. In the vicinity of Paris, near St. Germain, this flower is much cultivated in many varieties: I have brought them from that place. They multiplied rapidly, but were ultimately lost from inattention in winter. They require to be taken up in October and carefully housed away from the frost, and

then they will last many years. In the Tuileries gardens at Paris they have a pretty plan of planting them round the standard rose-trees, and supporting the flower-stems by tying them to the stems of the rose-trees.

In summer no plant adorns a garden more than the Lily.

"Fairest flower, behold the lily,
Blooming in the sunny ray:
Let the blast sweep o'er the valley,
See it prostrate on the clay."—BURNS.

Lilies are too little cultivated, but Mr. Wilson, the chairman of the Fruit Committee of the Horticultural Society, who collects these

FIG. 419.—White Lily.

FIG. 420.—L. lancifolium.

FIG. 421.—L. auratum

bulbs, has set an example which may lead to a more general cultivation of these elegant plants. How lovely is the White Lily (*Lilium candidum*, fig. 419) in June! What a grand appearance the varieties *L. lancifolium* (fig. 420) and *L. auratum* (fig. 421) present in September! All of these, and many other kinds, such as the *L. Martagon*, thrive in the open borders. One lovely species, the *L. canadense flavum* (fig. 422), I have figured from Mr. Wilson's collection, as one of the garden flowers of the future; but persons who have been in Japan tell me that to view lilies in all their glory they must be seen in that country. Many fine species

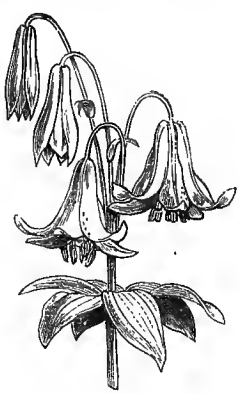


FIG. 422.—L. canadense flavum.

remain to be introduced from California. It is important in their culture that the bulbs should never become dry. Doubtless some function is always being performed by the bulb, although they appear to be at rest; hence any excessive drought is highly injurious. When planted, they should remain without being disturbed. Of the common Martagon Lily (*L. Martagon*) there are many varieties. The Scarlet Lily (*L. Chalcedonicum*) is a very showy flower. I have also tried the *L. giganteum*, from Nepaul, the flower-spike of which I have seen, at Paris, attain to a height of eight or nine feet. It is impossible to have too many species of lilies. They may be increased by division, and grown in a good rich soil.

"And here the lilies; by whose odour known
The way of life was followed."—DANTE.

FIG. 423.—Tigridia pavonia.

FIG. 424.—Canna indica.

FIG. 424*a*.—Calla Æthiopica.

The Tiger-flower (*Tigridia pavonia*, fig. 423) is a very extraordinary summer-blossoming flower. One or two of them should always be grown. With us the roots constantly perish, and have to be renewed; this year I have not one plant from which to give a figure. They are readily propagated by division of the bulb.

For plants of showy, summer-garden foliage decoration, nothing surpasses the varieties of Cannas (*Canna indica*, fig. 424). How

beautifully they decorated the Bois de Boulogne, and all the public places in Paris, till the French were led to neglect their peaceful gardens by the excitement of war! They are propagated by seed, and the tubers must be housed in winter, though they will withstand the effects of the climate in mild seasons.

FIG. 425.—Tuberose.

The *Calla Æthiopica* (fig. 424*a*) is an interesting plant for the greenhouse. Its trumpet-like white flowers, and glossy green foliage, render it very beautiful. It likes abundance of water. Formerly it was more appreciated than it is at present.

The last of the bulbous plants which I shall commend is the Tuberose (*Polyanthes tuberosa*, fig. 425). It is not much in favour in England, but is highly esteemed in Paris.

"The sweet tuberose,
The sweetest flower for scent that blows."—SHELLEY.

There is a bulbous plant which I strongly advise people not to grow; it is *Aconitum Napellus*, or Monkshood (fig. 215).

In September a very striking plant flowers, called *Tritoma Uvaria* (fig. 426), which rapidly throws up its flowers of scarlet and yellow. It is a large plant, and should have an open space in which to display itself. It grows naturally on the mountains at the Cape of Good Hope, where it is brilliant enough to be seen from a considerable distance.

FIG. 426.—Tritoma Uvaria.

FIG. 427.—Tritonia aurea.

Late in the summer, when flowers are scarce, the *Tritonia aurea* (fig. 427) flowers in the orchard-house and greenhouse. It produces handsome branching spikes of orange-yellow flowers, and is easily grown.

For the successful preservation of bulbous plants it is imperatively necessary that the labourer employed in winter to dig the ground should

be carefully watched, otherwise, in the absence of the gardener, he moves like an automatic machine, turning over the bulbs without the slightest remorse. Bulbous plants cannot be retained where the digging is done by labourers. Labourers in the bulb garden are as destructive as pigs, for what one uproots with its snout the other digs in with his spade.

Milton well describes a bulbous plant when he sings:—

"So, from the root,
Springs lighter the green stalk, from thence the leaves
More airy; last, the bright consummate flower
Spirits od'rous breathes."

PERENNIAL PLANTS.

"There sprang the violet all new,
And fresh pervinke rich of hew,
And floures yellow, white and rede,
Such plenty grew there never in mede."—CHAUCER.

In early spring the Violet (*Viola odorata*) is the choicest of our native flowers. When grown upon a well-exposed bank, where the plant is thoroughly ripened, a patch of violets in full blossom makes a magnificent display. There are many varieties, one of which, the single Russian (fig. 428), is very beautiful. The Czar has large leaves, and big, coarse, but highly-scented flowers. The single and double blue Neapolitan violets are great favourites at Paris and Florence, where they are used for bouquets. The colour of the flower is an exquisite pale blue, and when surrounded with white snowdrops, or themselves surrounding a white camellia, the effect is admirable. With me this variety is delicate, and, though I have had many plants, not one survives. It is well worth the protection of a frame. There are white violets and tree violets, both good. I have a little violet garden in which the different varieties are cultivated along with the British orchids. We also grow the wild yellow unscented violet;

FIG. 428.—Russian Violet.

and an improved florists' variety of it, raised by Parker of Tooting (fig. 429), is a desirable acquisition to the garden. All violets may be readily propagated by division or by runners.

"And beds of violets, blooming 'mid the trees,
Load with waste fragrance the nocturnal breeze."
KIRKE WHITE.

Florists' Pansies (fig. 430) are gay, and some of them beautiful. Particular cultivation, in a rich soil, is required to grow them fine;

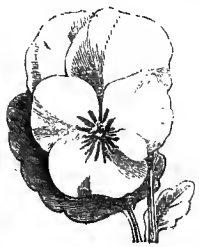


FIG. 429.—Parker's Yellow Violet.

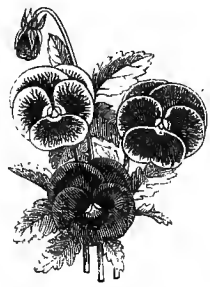


FIG. 430.—Heartsease.

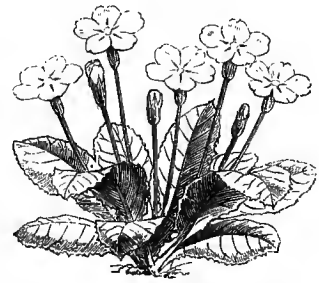


FIG. 431.—Primrose.

and for this reason they are not very useful for the general garden. There is a scentless species of blue violet (*V. cornuta*), which is grown for its colour, but I have not found it a very desirable plant.

"And there is pansies,
That's for thoughts."—SHAKSPEARE, *Hamlet.*

Undoubtedly one of the most perfect of wild flowers of this country, and one of the most beautiful in cultivation, is the common Primrose (*Primula vulgaris*, fig. 431).

"Where pale primrose, with watching wet,
The wild rose and the violet
Open to salute the day,
With strife and envy far away."—CRAWLEY.

The harmony of the colours of leaf and flower is perfect; and the whole plant, with its multitude of flowers, is particularly beautiful. We grow them by hundreds in our ferneries, and it is a grand sight to see them when their thousands of flowers are in blossom.

I have observed that primroses attain the greatest perfection in woods after the undergrowth is cut. The light is then let in, and the plants flourish, attaining the greatest perfection in the second or third year.

The double varieties of the common primrose cannot compare with the natural primrose for beauty, but may be grown for the sake of variety.

"The primrose pale and violet flower
Found in each cliff a narrow bower."
SIR WALTER SCOTT.

Bull last year introduced a superb flower to horticulture, called the *Primula japonica* (fig. 432). It is, perhaps, one of the finest plants which has been introduced, though at present it is too expensive for common use. Doubtless, in a short time, the price will be so reduced that it will come to be universally used for the choice flower-border, if not for the alpinery.

FIG. 432.—Primula japonica.

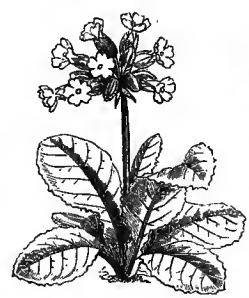


FIG. 432*a*.—Cowslip.

FIG. 433.—Polyanthus.

The lovely Cowslip (*Primula veris*, fig. 432*a*) adorns the meadows in our neighbourhood. The Polyanthus (*P. vulgaris*, fig. 433), which is a florists' flower of great merit, should also be grown by hundreds; some of the auricula-flowered varieties are of great beauty. They may be easily raised from seed, or by division of the roots. When raised from seed, it may be sown in a pan placed in a cold frame, in March, and the young plants afterwards pricked out.

"Now the bright morning star, day's harbinger,
Comes dancing from the east, and leads with her
The flowery May, who from her green lap throws
The yellow cowslip, and the pale primrose."—MILTON.

The *Myosotis sylvestris* and its white variety, also the superior species, *M. dissitiflora* and *M. rupestris*, which will be described amongst the alpine flowers, should abound in every garden in spring.

In May and the beginning of June the blue and white perennial Lupins (*Lupinus polyphyllus*, fig. 434) are fine plants, sending up noble heads of the brightest flowers. They are valuable additions to every border, and no care is required in their cultivation. They may be propagated by seed or by division of the roots.

"The snowdrop, and then the violet,
Arose from the ground with warm rain wet,
And their breath was mixed with fresh odour sent
From the turf like the voice and the instrument."—SHELLEY.

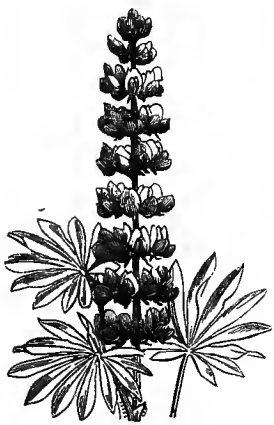


FIG. 434.—Lupin.

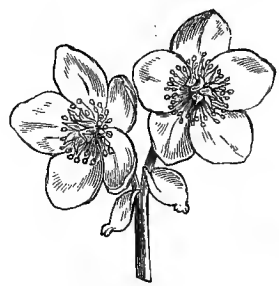


FIG. 435.—Christmas Rose.

FIG. 436.—Wallflower.

One of the most valuable winter-blooming flowers is the Christmas Rose (*Helleborus niger*, fig. 435), affording large white flowers when other blossoms do not exist. I have had much trouble in growing this plant, although it attains to the highest perfection a few hundred yards from my garden, and about twenty or thirty feet higher up the hill. My plants now, however, look well, as I secured strong vigorous specimens, and planted each in a few spadefuls of good

top split loam. This month (January 1872) we have a grand display of these flowers.

No garden can possibly do without its Wallflowers (*Cheiranthus Cheiri*, fig. 436) for early spring blossoms. The odour and the colour are charming; and the power of the plant to grow from the perpendicular side of a dry chalk-pit, or on the top of a dreary wall, renders it a plant which every horticulturist must love. I prefer the common mixed seedling wallflowers. Others like the German varieties, but nobody can fail to delight in the double yellow greenhouse wallflower, which can easily be propagated by cuttings, though it is now much neglected in gardens.

FIG. 437.—Doronicum caucasicum.

FIG. 437*a*.—Double Daisy.

FIG. 438.—Variegated Lily of the Valley.

There is a valuable spring plant which is not often grown, but which makes a great display, called the *Doronicum caucasicum* (fig. 437.) The beautiful harmony of colour between its bright yellow flowers and the peculiar yellowish green tint of its leaf, is particularly refreshing, when contrasted with some of the distortions of form and colour produced in many flowers by modern floral art.

Early in the spring, the florists' varieties of the Daisy (*Bellis perennis*, fig. 437*a*) show their flowers; which, however, are immeasurably coarser and less refined in their character than the wild daisy of the fields which children delight to gather, and make into wreaths wherewith to adorn themselves.

In the month of May the Lily of the Valley (*Convallaria majalis*) is the favourite flower. It is one of our native plants, is readily propagated by division, and, when planted, it should be left alone

for years. Every two or three years, in autumn, I sprinkle a little manure over the surface, which I fancy is beneficial. It likes neither too much sun nor too much shade. There is a variegated-leaved variety (fig. 438), which, when carefully grown in a pot, presents a fine appearance. There is also a variety of a pinkish hue, which, however, is not to be compared with the natural plant.

After the lily of the valley, and commencing at the end of May or beginning of June, we have in succession the Pink, Picotee, and Carnation. The double white pink (*Dianthus plumarius*, fig. 439) flowers first, other florists' varieties (fig. 440) speedily follow, and as soon as they disappear the picotees and carnations embellish the garden. They may all be raised from seed sown in a cold frame; and plants raised one spring flower the next year. Varieties of pinks may be readily propagated in June by taking the young shoots and cutting them at a joint. These are then placed in a puddle made by stirring up the earth with water till it is converted into mud; and as the water drains off, the earth comes into close contact with the cutting. A hand-glass covers all, when after a few weeks a very large proportion will be found to have taken root. These are pricked out, and transplanted in spring, when they flower. It is important for a garden to have an abundance of pinks.

FIG. 439.—White Pink.

FIG. 440.—Variegated Pink.

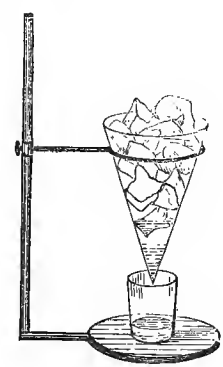


FIG. 441.

The delicate odour of pinks and other flowers may be obtained by a process devised by my son. He uses a glass funnel (fig. 441) with the narrow end drawn to a point. In this funnel he places lumps of ice with salt, by which a very low temperature is produced. The funnel is supported on an

ordinary retort stand, and placed near the flowering plants, when water and the ethereal odour of the blossom is deposited on the exterior of the glass funnel, and trickles down to the point, from which it drops at intervals into a glass vessel below. The scent thus obtained is very perfect and interesting, but is apt to become sour in a few days unless some pure alcohol is added. By this process many odours may be procured for comparison and study. To obtain the odour in perfection the blossom must be in its prime. It is remarkable that up to this time no scientific work has ever been written upon odours. The Italians have a proverb :—

"Ogni fiore al fin perde l'odore."

Carnations (fig. 442) and Picotees (*Dianthus caryophyllus*, fig. 443) do not strike so freely as pinks, and therefore it is usual to propagate by layers.

"The fairest flowers o' the season
Are our carnations."—SHAKSPEARE.

Pinks, Carnations, and Picotees are particularly adapted for dry, sunburnt spots, as they stand drought well.

FIG. 442.—Carnations (two varieties).

FIG. 443.—Picotees (three varieties).

FIG. 444.—Large Soapdragon.

In a dry border the Snapdragon (*Antirrhinum majus*, fig. 444) is very gay. It is easily raised from seed, and the colour of the flower is very varied. A plant will live for years, but severe frost kills it. Like the wallflower, it will grow in a crevice of a wall, and it is a plant well adapted to be used in quantities in every sunny

border, as it requires little or no trouble in its cultivation. Any fine variety may readily be propagated by cuttings. Florists dignify the finer kinds with names which are neither worth recording nor committing to memory.

The *Aquilegia vulgaris*, or Columbine (fig. 445), is a fine plant, which may be grown occasionally as a single plant. Three or four in a garden are sufficient. There are many varieties and several species of aquilegia.

FIG. 445.—Variegated Columbine.

FIG. 446.—Perennial Larkspur.

Delphinium formosum, or Perennial Larkspur (fig. 446), is another border plant of high merit. It is easily raised from seed in the open border, and the plants will last several years. The colour of the flower is a most brilliant blue; and amongst its varieties there is a pale blue flower of matchless hue, called the *Delphinium Belladonna*. There are numerous other varieties of more or less merit.

For a bright yellow flower, few can surpass the *Eschscholtzia californica* (fig. 447), which was introduced into this country by the Horticultural Society, having been discovered by Mr. Douglas. The flowers are very brilliant when seen in a mass; it is, however, a little tender.

FIG. 447.—Eschscholtzia californica.

FIG. 448.—Pentstemon.

We must not omit Pentstemons (fig. 448) from the list of our common border plants. There is a disadvantage attending their use, as they are killed in severe winters and have to be protected in frames. Nevertheless, there are many beautiful varieties which should

ever adorn a garden. Some of the delicately pencilled flowers are to my mind exquisite. There are several species in cultivation.

All the plants hitherto described decorate the garden in spring and summer; but for late summer and early autumn blossoms we must have recourse to herbaceous phloxes, dahlias, hollyhocks, and chrysanthemums.

There is a period of the year when flowers are scarce, as in the latter part of August and the end of September. At this time the effect of the flower of the Herbaceous Phlox (fig. 449) is paramount. The plants throw up stems from three to four feet high, and, when two or three years old, present such magnificent heads of flower, and of such beautiful colours, as to give really a character to the garden. They must not obtrude into geometrically formed beds, but their gorgeous display must be restricted to more subordinate positions. A great many plants should be grown, embracing a number of varieties. They are easily propagated by division, and varieties are obtained by sowing seed of the most approved kind, and then selecting the finest produce for permanent cultivation.

FIG. 449.—Herbaceous Phlox.

FIG. 450.—Hollyhock.

In the background the Hollyhock (*Althæa rosea*, fig. 450), with its magnificent yellow, red, and almost black flowers, stands conspicuously prominent behind the herbaceous phlox. It grows very fine and very freely at my garden, and the flower is so grand that it ought always to be cultivated. It is easily raised by seed, and propagated by cuttings.

FIG. 451.—Dahlia.

The Dahlia (fig. 451), a melancholy reminder of departing summer, comes to our aid for the embellishment of the garden at the end of August and during September. The plant was introduced at the

beginning of this century: it is a coarse flower, and should only be sparingly admitted into the general garden. It has tuberous roots, which must be protected from the frost in winter. These send up shoots in spring, from which, as cuttings, the plant may be readily propagated. The Dahlia is a native of Mexico, and innumerable floral varieties are now cultivated.

In October there are two plants which have an exceedingly striking appearance: the larger (*Rudbeckia*, fig. 452), with its brilliant flowers, can be seen across the garden; and the smaller (*Helianthus*, fig. 453)

FIG. 452.—Rudbeckia.

FIG. 453.—Helianthus decapetalus.

FIG. 453*a*.—Sea Holly.

is nearly as striking. As they are rather large and coarse-growing, they must not be allowed to intrude on more delicate-growing plants. A garden without these plants is deprived of so many beautiful flowers. The Sea Holly (*Eryngium maritimum*, fig. 453*a*) is also an interesting plant.

One of the last flowers of all comes *Chrysanthemum sinense* (fig. 454), of which there are endless varieties: some tall, with large flowers, growing to a height of six feet (*C. sinense*); others very dwarf, and with small flowers, called Pompones (*C. indicum*), admirably adapted for dinner-table decoration, and lasting till the first week in January. Some are called anemone-flowered, because the flower has a resemblance to an anemone; and there are some from Japan which have loose flowers. Chrysanthemums do not succeed well with me, but grow admirably in the north of London, at Stoke Newington, where there

are annual Chrysanthemum exhibitions. I was once president of one of these societies, and was much gratified by observing the pleasure which the superior mechanics and the middle class in possession of small gardens took in rearing these plants. At the Temple Gardens, the gardener, an ardent lover of plants, has astonished the floral world by his success under disadvantageous circumstances. At the middle valley of Brighton the gardens at the end of November are quite bright with these flowers. Wherever it is possible they should be grown, and those who have an orchard-house may cultivate them in great perfection by growing them in pots in the open air as late as possible, and then placing them in the orchard-house, when fine flowers can be obtained. The flowers of the Chrysanthemum have

FIG. 454.—Chinese Chrysanthemum.

FIG. 455.—Japanese Chrysanthemum.

FIG. 456.—Pompones.

the valuable property of keeping in blossom a long time after they have been cut, which is useful in the dark months of November and December, when flowers are scarce and precious. The colour of the larger flowers varies from the brightest yellow and various shades of red, to the purest white. During the last two or three years the Japan varieties (fig. 455), with loose petals, have come into cultivation. The small Pompone varieties (fig. 456) are most useful or table decoration. For exhibition purposes a little warmth is used to develop the flowers, and all side flower-buds are cut out. I regret to state that curling irons and other instruments are employed to manufacture a regularity in the petals of the flowers, which are in fact treated for exhibition in the same way as the hair of a lady's head when she is going to a State reception.

Varieties of the Chrysanthemum are raised from seed, and then may be propagated by cuttings, or by a division of the old roots. During their growth in pots plenty of liquid manure should be given to them.

There are various species of Peas which are grown, but with the exception of the annual Sweet Pea all of them take a subordinate position in a garden. The larger Everlasting Peas (*Lathyrus latifolius*) are handsome in their appropriate place, and so are some of the smaller perennial species, such as *L. tuberosus*. They may be easily raised from seed, and the plants will stand in the same situation for many years.

I always feel interested in the *Acanthus mollis* (fig. 457), as the foliage of that plant suggested the form used for the capitals of the Greek columns; and when we see it growing, its classical associations are always pleasing to the mind. There are several other species of Acanthus which I do not cultivate.

FIG. 457.—Acanthus mollis.

FIG. 458.—Lobelia fulgens.

The *Lobelia fulgens* (fig. 458) is one of our most lovely plants. It grows badly in my garden, and constantly dies; nevertheless it is as constantly replaced. The leaf is highly coloured, and the flower is an intense scarlet, and has the merit of flowering late in autumn. It may be easily propagated by cuttings.

Of late years the florists' varieties of *Pyrethrum carneum* (fig. 459), from the Caucasus, have been much cultivated in some gardens. They are not great favourites with me, as they are somewhat straggling in habit. The varieties are numerous, and they have the double merit of being perfectly hardy, and of being readily propagated by cuttings.

FIG. 459.—Double Pyrethrum.

A very showy flower, the Peony (fig. 460), blossoms at the end of May. There are many varieties; they are more remarkable for their size than for their beauty. I have had various plants, but never have been satisfied with any of them. There are many fine kinds which will hardly flower in our climate. The Chinese and Japanese are reputed to possess endless varieties of these flowers.

FIG. 460.—Peony.

The *Gunnera scabra* is a remarkable plant, with ornamental leaves somewhat resembling those of rhubarb. It likes a moist situation, and it requires protection from severe frost.

"O perennial flowers,
In single breath your odours manifold
Breathe now."—DANTE, *Paradise.*

BEDDING PLANTS.

For summer garden decoration we have recourse to what are termed Bedding Plants. These are at once the blessing and the curse of a garden. They are a blessing, as they give to geometric flower-beds a display of thousands of brilliant flowers for four months in the year, and the plants themselves are regular in their growth. Nevertheless they are a curse, as they are so easily grown that they have gradually superseded all those plants which our forefathers used to cultivate and admire. I have seen flower-beds under the drawing-room window of a mansion where numerous gardeners were kept, without one plant to adorn the vacant ground till the end of May, the whole decoration being confined to summer, and centred in a few kinds of bedding plants, in some whimsical ornamental arrangements of colours. At the present time all gardens look alike; the inevitable gaudy Scarlet Geranium flourishes to the exclusion of hundreds of little gems which should have their place in the garden of every lover of natural objects; and,

on this account, I have restricted the use of bedding plants at my garden to their legitimate proportions.

There are numerous varieties of Geraniums, or, more properly speaking, Pelargoniums. Some of their leaves are either golden variegated, golden and bronzed, or golden-leaved and golden-edged; others are either silver variegated or silver-edged; lastly, there are others which are zonal and plain leaved. If the plain truth be told, the floriculturists have worked the pelargoniums out by raising multitudes of seedlings till the varieties run into each other so closely that one can scarcely be distinguished from the other; and thus they have covered the whole ground within the limits of variation which it is possible for a single species to assume; but with all this variation no new species has been formed. Probably one of the finest variegated geraniums which have ever been raised by the process of artificial selection is that called Mrs. Pollock, the leaf of which (fig. 461) is so exquisitely coloured when thoroughly exposed to light and air, that a single leaf may be used either for a lady's brooch or as an ornament

FIG. 461.—Mrs. Pollock Geranium (leaf).

FIG. 462.—Pelargonium.

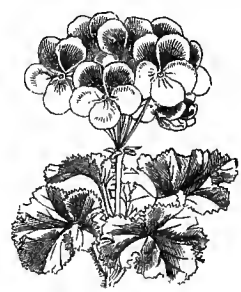


FIG. 462*a*.—Pelargonium.

to be worn in the hair. We grow other variegated kinds which may be selected according to fancy. All these highly-coloured leaves are best displayed without flowers, and it is a good plan to pluck the flowers as fast as they appear. Other bedding geraniums, or Pelargoniums as they are generally called (fig. 462), are grown for their flowers, of which two or three shades of colour should be selected, but scarlet and crimson should be the predominant colours. Of late years beautiful greenhouse varieties (fig. 462*a*) have been neglected, and worthless double-flowering geraniums have been introduced.

Cuttings of bedding geraniums are taken in August, and rooted either in pots or in the open borders. They are sheltered in the greenhouse during winter, and allowed as much light as possible. They are planted in the border the last week in May.

"Geranium boasts
Her crimson honours; and the spangled beau,
Trioides, glitters bright the winter long."—COWPER.

The next useful plant is the shrubby Calceolaria (fig. 463), which affords multitudes of bright yellow flowers. It is tender, and requires to be kept in the greenhouse during the winter, but in warm seasons it yields abundance of blossom.

FIG. 463.—Calceolaria.

FIG. 464.—Lobelia.

FIG. 465.—Petunia.

For a blue flower for beds recourse is generally had to the Lobelia (*L. syphilitica*, fig. 464), of which a very dwarf sort, recently introduced, is the most beautiful. There are many varieties of this plant, of many shades of colour.

FIG. 466.—Ageratum mexicanum.

The flower of the Petunia (fig. 465) is very lovely, but the plant grows too large and weedy to be admitted into the set geometric flower-garden. It is raised from seed, and the garden varieties, which are numerous, are perpetuated by cuttings.

The *Ageratum mexicanum* (fig. 466) is another flower of pale blue colour, which is often used for bedding purposes, and of which there are numerous florists' varieties. It is a biennial plant.

The Verbena (fig. 467) is now much neglected, perhaps on account of a difficulty which has arisen of late years in its cultivation, as aphides, fungi, and unknown causes make it die during the summer. A well-broken bed of verbena flowers, such as was annually grown at Hampton Court Gardens, is one of the finest sights in floriculture; and at my garden a bed of seedlings which the gardener raised, and which occupied a vine border of about two hundred square feet, was the most exquisite floral production in the whole garden for a period of at least three months. When planted round the base of any of my pyramid rose-trees, they are very beautiful. Florists dignify every appreciable variety by giving a fancy name to it, which is not worth any person's while to learn, so long as he obtains a variety of colour in his different plants, which should be white, tinted, scarlet,

FIG. 467.—Verbena.

FIG. 468.—Heliotrope (Jenny Lind).

FIG. 469.—Salvia patens.

or lavender. Some species are scented. Varieties may be raised from seed, and are subsequently propagated by cuttings taken in August, which are kept from frost in a glass-house all the winter, and planted out the last week in May.

The Heliotrope, another good bedding plant, is much neglected. A dark old-fashioned variety called Jenny Lind (fig. 468) is particularly desirable, but any other good kind may take its place. It is easily propagated by cuttings.

Salvias are not much cultivated at the present time. The blue Salvia (*Salvia patens*, fig. 469) is a fine plant, but it is somewhat difficult to keep through the winter.

The grand *Brugmansia suaveolens*, or *Datura arborea* (fig. 470), with its powerfully scented tubular white flowers, grows in the south of France and Italy into great trees, and is said to survive the winter in Devonshire and Cornwall. It is one of the chief ornaments of a highly cultivated garden, and is easily propagated by cuttings. It requires the protection of a greenhouse in winter.

FIG. 470.—Datura arborea.

FIG. 471.—Pyrethrum Parthenium.

FIG. 472.—Coleus.

Many persons much admire the Golden Pyrethrum (*P. Parthenium*, fig. 471) as an edging for bedding plants. The foliage is very bright in colour, but I cannot say that it is a favourite of mine. It is a native plant, and hardy, and may be propagated by division.

A considerable effect is produced by the different varieties of the Coleus (fig. 472). Some are exceedingly dark in the foliage, in fact almost black; others have their leaves fringed, and amongst the various kinds there is great diversity of colour.

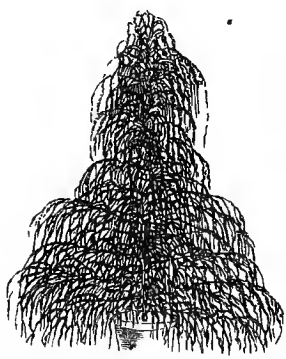


FIG. 473.—Amaranthus salicifolius.

A plant has been recently introduced by Veitch, the *Amaranthus salicifolius* (fig. 473), which promises to be a very interesting and graceful plant for the centre of flower-beds. It is, however, an annual, although used as a bedding plant.

At the present time many kinds of Echeverias are used as bedding plants, but I prefer to grow them in the alpinery. The *Echeveria*

metallica (fig. 474) is a noble plant, with large fleshy leaves, contrasting well with other alpine plants. The *Echeveria secunda* has finely coloured light green leaves, and there are several other species of echeverias, as *E. sanguinea* (fig. 474*a*), and sempervivums which I grow, and which are admired; they require the warmth of a greenhouse during winter.

It is usual in the early part of the month of May to place all bedding plants out of doors, and to cover them with a mat at night. Upon an average, in the neighbourhood of London, the last week in May is sufficiently early to plant them out; for however warm the first week in May may be, yet almost invariably during the second and third weeks severe frosts occur, and sometimes even snow falls.

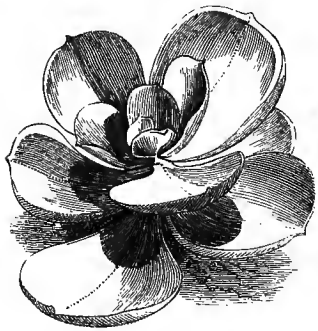


FIG. 474.—Echeveria metallica.

FIG. 474*a*.—Echeveria sanguinea.

FIG. 475.—Gazania.

A wayside plant of Southern Africa, which has a large bright orange-coloured flower, is a very handsome bedding plant. It is called the Gazania (fig. 475). It is readily propagated by cuttings, and it flowers freely all the summer.

Extraordinary beds are sometimes made by arranging fancy patterns, as ugly as those on Turkish smoking caps, of mixed geraniums, echeverias, sempervivums, verbenas, saxifrages, and numerous other plants, but they are rather a source of wonder than of admiration to the true lover of nature. Still more extraordinary imitations of flower-beds are made of white stones and bits of coloured bricks, formed into a pattern with box edging. The Horticultural Garden at South Kensington has some such contrivances, and before Bethlehem Hospital there were extensive ranges of such designs, but whether

made by the unfortunate inmates or by the gardener I have never been informed; certainly these devices come under the category of horticultural monomanias.

ANNUALS.

"The seed, selected wisely, plump and smooth
And glossy, he commits to pots of size
Diminutive, well fill'd with well-prepared
And fruitful soil, that has been treasured long
And drank no moisture from the dripping clouds."—COWPER.

There are many flowers the seed of which is sown in spring; when the plant grows, the flower dies down and has to be renewed the next year; many of these may be used to decorate a garden. Care must be taken in the growing of annuals, for if the seed is sown too thickly the plants are spoiled, and take even the appearance, especially in a state of decay, of ugly weeds. To be beautiful each plant should stand alone: thus one nemophila makes a charming plant, one mignonette will measure two feet across, a single sweet-pea will form an exquisite bush; therefore every kind of annual, even to the smallest Virginian Stock, should stand singly, and have abundance of space.

FIG. 476.—Nemophila

FIG. 476*a*.—Clarkia.

FIG. 477.—Early Sweet-pea.

The Virginian Stock (*Malcolmia maritima*), and a variety of a rose colour, may be used to give colour to the garden in early spring. At the same season of the year the Nemophilas (fig. 476)—of which there are several varieties—are very beautiful in the borders; for this purpose, the seed should be sown in autumn. Later in the season the Clarkia (fig. 476*a*) is a useful plant.

After the Nemophila, the Sweet-pea (*Lathyrus odoratus*, fig. 477) flowers, of which there are several varieties. I like to grow only one plant in a place. I have a variety which is self-sown every year, and stands through the winter; it branches in early spring, and produces an abundance of flowers, and ripens its seed in August.

The Convolvulus major (fig. 477*a*) must never be omitted from the

FIG. 477*a*.—Convolvulus major.

FIG. 478.—Coreopsis tinctoria.

FIG. 478*a*.—Venus's Looking-glass.

list of our annual plants. Those who visit their gardens betimes in the morning see this lovely annual in all its glorious perfection.

An occasional plant of the *Coreopsis tinctoria* (fig. 478), which flowers in August, should never be omitted from the garden.

FIG. 479.—African Marigold, orange double.

FIG. 480.—African Marigold, single.

FIG. 481.—Zinnia elegans.

Venus's Looking-glass (*Specularia speculum*, fig. 478*a*) is a charming dwarf annual, eligible for the edges of borders.

A single plant here and there of the African Marigold (*Tagetes erecta*, fig. 479), planted so as to stand out boldly and show itself, is fine for the border. The seed requires to be sown in heat in April, and the young plants pricked out in May. A dwarf variety of marigold (fig. 480) is very ornamental.

The *Zinnia elegans* (fig. 481) in many of its numerous varieties may be grown in the same manner, as the colours of the flowers in mid-summer are really fine.

The large biennial Stocks do not succeed well at my garden, nevertheless there are numerous annual stocks (*Mathiola*, fig. 482), both single and double, which may be grown for their beauty and fragrance. The seed should be sown in spring under the protection of a frame, and the plants pricked out, when they flower the same year.

The Mignonette (*Reseda odorata*, fig. 483) is an annual which should never be forgotten. There is a large variety which is now invariably grown; and if placed in a favourable situation, with full exposure to light and air, a single plant is not only fragrant but ornamental. With care it may be grown into a tree by allowing it to orm a stem, and keeping it in a greenhouse during the winter, but to my mind the tree does not compare with the plant grown in a natural way.

FIG. 482.—Stock.

FIG. 483.—Mignonette.

FIG. 484.—Everlasting.

There is an interesting group of plants called Everlastings (fig. 484), on account of the stiffness of the flowers, which last for a considerable period. It is desirable to sow them in a frame, and plant them out afterwards, though many will do perfectly well if sown in a border in spring. The everlasting which is used for the mmortelles in France is grown in my alpinery, and is a perennial plant.

For back places, an occasional Giant Sunflower (*Helianthus giganteum*, fig. 485) shines forth. This plant attains the height of about

six feet. The central flower is enormous, and usually five or six side-flowers are thrown out from the stem. A small boy employed in the garden once took a visitor to this flower, and said, "Please, sir this is the finest flower in the garden."

The *Dianthus chinensis* (fig. 486) and its varieties are very beautiful. The seed should be sown early in March, in a frame, and the young plants pricked out afterwards in the borders. The flowers are large, and

FIG. 485.—Sunflower.

FIG. 486.—Dianthus chinensis (Heddewigii).

FIG. 487.—Phlox Drummondii.

finely pencilled, and we obtain blossom in August and September. Some seedlings yield single flowers and some double, but both are beautiful. The variety called *Heddewigii* is remarkable for the size of the flowers.

Another annual of great beauty, and much used everywhere, is the *Phlox Drummondii* (fig. 487). It is a plant having considerable variety of rich colour, and should be grown every year. It may be employed with advantage for edging beds.

FIG. 488.—Chilian Beet.

I have been much struck with the effect which is produced at the Zoological Gardens by the use of Chilian Beet (*Beta chilensis*, fig. 488), the veins of the leaves of which are intensely and variously coloured—some brilliant scarlet, others yellow; and the large fleshy leaf, and the intensity of its colouring, make it an important plant for decoration. The seed should be sown in March or April in a pan, and planted out in May. It is

a large plant, with leaves more than two feet long, so that it should not be used in too prominent a position, although I find it very ornamental in my garden.

Another striking plant of rare beauty is the variegated Indian Corn (*Zea Mays*, fig. 489). The male and female flowers are separate, and every future corn has a slender hair-like prolongation to receive the pollen as it falls. It is worth growing for this phenomenon alone, but the whole is graceful and beautiful, especially in warm summers. The corn should be sown in a frame in March, and transplanted in May.

FIG. 489.—Indian Corn.

Of all the annuals, the most charming florists' flower, for late summer, is unquestionably the Aster (*A. chinensis*, fig. 490), from the brightness and diversity of the colour of its flower. They are divided into varieties called chrysanthemum-flowered, pyramidal, peony-flowered, quilled (fig. 491), miniature, and other varieties. We depend upon

FIG. 490.—French Tasselled Aster.

FIG. 491.—German Quilled Aster.

FIG. 492.—Garden Scabious.

ore'gners for the seed of these beautiful flowers. Sometimes it is excellent, and the flowers lovely. At other times, I have purchased seed which was very indifferent. When I go to Paris I generally purchase a packet of seed, though I have sometimes had it better, and sometimes worse, from the seedsmen of this country. The seed should be sown thinly in a pan, in a cold frame, and transplanted

in May. When the seed is good, Asters and Stocks are the most desirable of all annuals, and a nice bed is a beautiful sight. Good seed is rather expensive; hence it is a luxury in which I do not always indulge.

The Scabious (*Scabiosa atro-purpureus*, fig. 492)—either large-flowered or dwarf—is a nice flower, and it is well to have a plant dotted about here and there. The seed may be sown in the open border early in May.

A very showy flower for summer blossom is the *Convolvulus minor* (fig. 493), the colours of which are chiefly white, purple, blue and white, and violet. It is a very handsome flower, and useful when judiciously introduced into the flower-bed.

FIG. 493.—Convolvulus minor.

FIG. 494.—Sweet Sultan.

FIG. 495.—Evening Primrose.

Lupins are another class of annuals having merit, and yet so very inferior to the perpetual Lupins, as not to be required when the latter are grown. There are many effective varieties which may be introduced sparingly into the general flower-bed. Like all other annuals, single plants are beautiful, but a dense mass is unsightly. The Sweet Sultan (*Centaurea moschata*, fig. 494) may also be sparingly grown in the flower-beds.

The Evening Primrose—a charming plant, which I have seen growing wild by the side of the Danube (*Œnothera biennis*, fig. 495)—has a bright yellow flower; it grows about three feet high, and may be usefully introduced into the garden. It is a good London plant, and I have had them for many years from self-sowing in Finsbury Circus. The perfume of the flower is delicate and the

colour extremely beautiful. It is easy to grow, although it has only a place in the remote parts of my garden. There are many species of this genus.

For back places Nasturtiums are useful. They flower freely, and grow in any garden soil. The different varieties are scarlet, orange, yellow, red, and spotted. The seed is sown in May.

Where large foliage is thought advisable, nothing will compare with the Castor Oil plant (*Ricinus communis*, fig. 496). The seed is sown in early spring, in frames, and the young plants potted: by the end of August they are five feet high. Its noble leaf and stately form are truly remarkable. It is not uncommon for travellers, when first they see the richly marked seed of this fine plant, to be induced to eat a few of them; the violent cathartic properties of which in a

FIG. 496.—Castor Oil Plant.

FIG. 497.—Annual Larkspur.

FIG. 498.—Portulaca Thellusonii.

few hours show their unpleasant effects. These seeds, when pressed, yield the mild castor oil; but the seed itself is excessively powerful in its effects.

The Annual Larkspur (fig. 497) is very showy, and, when once planted, it will self-sow itself for years.

On dry banks besides snapdragons, wallflowers, and pinks, Portulacas (fig. 498) may be grown. There are numerous varieties, both single and double: they are gorgeous summer flowers, of many shades of colour. The seed should be sown in a pan and the plants pricked out in

the border. The drier the weather and the more burning the sun, the finer the plants and the more brilliant the flowers. It is a plant much grown in the hot sun of Italy, but very little in this country; but wherever a dry, gravelly, sun-baked border exists, there the Portulaca should be planted.

> "Full gay was all the ground and queint,
> And poudred, as men had it peint,
> With many a fresh and sundry flour,
> That casten up full good savour."—CHAUCER.

BIENNIALS.

There are many plants which are grown one year, and form their flowers the second. These are called Biennials, and, like annuals, each plant should stand alone, and have sufficient room around it to develop its beauties.

Of biennials, some of the large varieties of Stocks are splendid. At Cheltenham I have been surprised at their majestic appearance but with me the plants have invariably died during the winter.

For a summer flower, growing in shady places, the Foxglove (*Digitalis purpurea*, fig. 499) stands unrivalled. It is a native of this country; and a single plant, as it grows in the lanes of Devonshire, attains to a height of six feet, and has numerous side stems, each having its group of flowers. The natural flower is exquisitely beautiful, but there are florists' varieties which are highly commendable. I use the foxglove in quantities to adorn the shady parts of my ferneries, and those parts of my garden where the general flower garden merges into the ferneries and alpineries By sowing seed in spring, strong flowering plants are obtained for the next year. This plant grows in Epping Forest, and in most woods.

FIG. 499.—Foxglove.

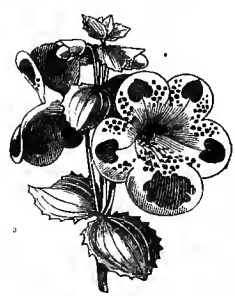


FIG. 500.—Mimulus.

The common Musk plant (*Mimulus moschatus*, fig. 500) grows well in a moist peaty soil, and in shallow streams, and frequently comes up the next year when once introduced into a garden. The larger flowering species of mimulus may be readily grown from seed in a frame and then planted out, when it flowers freely all the summer, but it is killed by severe frost.

The Poppy is a gaudy summer flower. The florists' varieties are innumerable, and indeed very splendid. They are, however, only adapted for subordinate flower-beds.

The Horn Poppy (*Glaucium luteum*, fig. 501), and a florists' variety of it, may be grown sparingly, as a plant or two are interesting. It grows abundantly by the sea-shore near Brighton, where its long seed-pod cannot fail to attract attention.

FIG. 501.—Horn Poppy.

FIG. 502.—Canterbury Bell.

FIG. 503.—Sweet William.

Formerly Canterbury Bells (*Campanula Medium*, fig. 502) were invariably grown. They are perfectly hardy, and contribute to the beauty of the general flower garden. Some of the larger perpetual campanulas may be grown, but many species of this lovely flower I restrict to my alpineries. The pink variety is very fine.

The Sweet William (*Dianthus*, fig. 503), when fine, is a desirable plant for the flower garden. The blossoms of many of the varieties are finely pencilled. The seed is sown in May, and the seedlings are planted out after a rain in summer, when they bloom the succeeding summer.

GREENHOUSE PLANTS.

We have no conservatory, but only a cold glass shed, yet we contrive to grow many plants by keeping them under the vines in winter, and by removing them to the glass shed or outer air in spring. Indeed some of my plants are simply placed in the cold frames and matted over in frosty weather.

First and foremost, the Camellias (*Camellia japonica*, fig. 504) give us noble flowers in the spring. The camellias were introduced into Florence from Japan by a monk of the name of Camellus, and to this day they are extensively grown in that elegant city. There they attain to the dimensions of trees, having thousands of blossoms; and at one private garden about 1,200 varieties are grown. At Florence, and indeed along the shores of the Mediterranean, they are grown in rotten chestnut wood, and flourish abundantly in that material. In England such material cannot be procured, but I have tried rotten tan and also fibrous peat with success, and I am now trying cocoa-nut refuse as a substitute for chestnut wood, but am unable to give an opinion upon its merits at present. Rotten elm wood did not suit the plants; but it is plain from what the Florentine gardeners told me that our mode of culture is not right. Camellias are raised from seed at Florence, by sowing it in a shady place in the open ground. If the flower of any seedling plant is satisfactory, the plant is named and propagated by grafting: if unsatisfactory, it is used as a stock upon which an approved kind is worked. I have raised seed which was given to me at Florence, but have never grafted the young plants. Out of such numerous varieties it is impossible to particularize many; yet every garden should possess the double white, the *fimbriata*, and some of the double red and shaded kinds. The names of my camellias have not been carefully kept; but I consulted Mr. Veitch, who kindly favoured

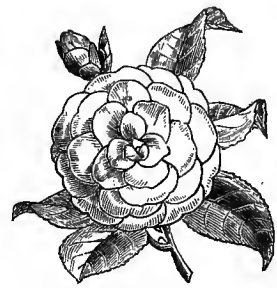


FIG. 504.—Camellia.

me with the following list of sorts, which, in his opinion, are the finest in cultivation :—

Alba plena : double white.
Arch-Duchesse Augusta : crimson, veined with purple, tipped with white.
Bealii : bright crimson, semi-double.
Carlotta Papudoff : fine rose, marbled.
Caryophylloides : blush, spotted and striped with crimson.
Comte de Gomer : pale rose, striped with crimson.
Countess of Orkney : pure white, striped with carmine.
Duchesse de Berri : beautiful white, good form, and freely imbricated.
Fimbriata : pure white, beautifully fringed.
General Drouot : rose, striped with white.
Lavinia Maggi : white, with crimson blotches.
Mathotiana : bright crimson, large.
Mathotiana alba : beautiful white, large.
Princess Frederick William : carnation, striped.
Queen of Beauties : delicate blush.
Reticulata flore-pleno : double rose.
Saccoi nova : rosy pink.
Storyii : rosy pink.
Valtevaredo : rose, fine form.

Camellias have hardly done thoroughly well in my garden; in all probability because the soil has not been suitable. They like plenty of water at their roots, and syringing overhead. We keep them in the Poor Man's House till June, and then place them out of doors till October. Camellias do not like artificial heat; it causes the blossoms to drop off. They live out of doors in mild winters, but severe cold kills them.

Azaleas flourish at my garden. We have them in blossom from January till June. The Indian Azalea (*Azalea indica*, fig. 505) is remarkable for the purity of the colour of the flowers; and I am told by those who have seen a mountain-side in India covered with azaleas in flower, that it is a sight of marvellous beauty. We grow them in the top spit of the neighbouring common, which is light and sandy, and has abundance of fibre. The greater part of the azaleas are simply stored in one of our cold frames, well matted over in severe weather; others are forced, to give us early flower, and at the end of June they are placed out of doors till October. With us they flower abundantly, and are perfect pictures. Azaleas have the advantage of being easily propagated by cuttings.

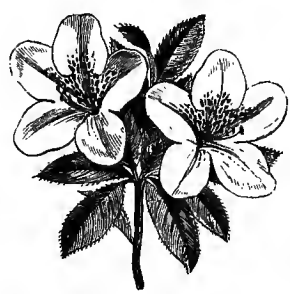


FIG. 505.—Azalea indica.

Although azaleas are such charming plants, I have never remembered the names of varieties, and so have trusted to the kindness of the distinguished florist Mr. Veitch to recommend a few of the most unexceptionable: yet I must say I never saw an ugly *Azalea indica*, or one which it was not desirable to cultivate. The following is Mr. Veitch's list:—

Cedo nulli: dark purple.
Countess of Flanders: bright rose.
Eclatante: very bright scarlet.
Duc de Nassau: rosy purple.
Extranei: rich violet rose.
Iveryana: white, striped with rose.
La Déesse: salmon rose.
Madame Dominique Vervaene: rose.
Madame Vervaene: fine white.
Roi d'Hollande: deep scarlet.
Souvenir du Prince Albert: bright rose.
Stella: bright orange scarlet.

It is usual to trim azaleas into ugly pyramidal bushes, and to tie the branches to stakes. This makes them look unnatural, and spoils their habit. Upon remonstrating with a gardener at the Botanical Society upon this barbarous practice, he shrugged his shoulders, and said he must be in the fashion, and that was the manner in which azaleas were exhibited at flower shows.

Fig. 506. Epacris.

The Oleander grows wild in Spain beside rivers; in England it requires a greenhouse. There are many varieties. I have a cutting from a tree at Pompeii, and it grows most freely from cuttings, even if simply placed in a bottle of water.

"Where Oleanders flush'd the bed
Of silent torrents, gravel-spread."
TENNYSON.

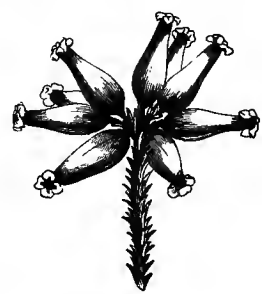


Fig. 507.—Erica.

We have a few plants of the *Epacris* (fig. 506), which are useful to cut for nosegays in early spring; and also two or three *Ericas* (fig. 507). Either too much or too little water is hurtful to both of these plants; and therefore if they do well it is a good proof that the gardener understands how to water his plants; but if he contrives to kill them, he may be sure he has more to learn. No plants show this particular knowledge of a gardener so well.

The *Daphne indica* (fig. 508) is a long time in flower, and the perfume of the blossom is exquisite. My plants are apt to die suddenly, without any apparent cause.

FIG. 508.—Daphne indica.

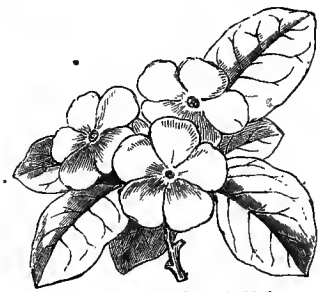


FIG. 509.—Franciscea latifolia.

FIG. 509*a*.—Tea-tree.

The *Franciscea latifolia* (fig. 509) is a plant not much grown, although inferior species of the same genus, without scent, are commonly exhibited at the flower shows. Although a reputed stove plant, it will grow in the greenhouse, and may be placed out of doors in spring, when it flowers most abundantly, and is very fragrant. *F. Hopeana* is a free bloomer, but has a smaller flower and requires more heat than the preceding.

We have had many economic plants at one time or the other, such as the Tea (fig. 509*a*), Coffee, Sugar-cane, Patula, Rice, and other species; but I have only one or two now. Wherever I go round London there is one constant complaint, that the gardeners set their faces against these interesting productions, and contrive that they either get too much or too little water, or too much or too little heat. At the present time I know no one who has a really fine collection, and probably no such collection will exist until the Horticultural and Botanic Societies change their system of prizes, and pay less attention to the production of gaudy florists' flowers.

FIG. 510.—Lasiandra.

The *Lasiandra* (fig. 510) is a magnificent genus for conservatory decoration. Mine has a deep blue flower, but is rather straggling in its growth.

I have a plant of the Balsam of Peru (fig. 511), in which I take some interest, as I raised the original plant at Finsbury Circus from seeds given to me by the learned Dr. Pereira, which was named by Dr. Lindley the *Myrospermum Pereiræ*. Before that time the plant whence the Balsam of Peru was extracted was unknown. I have had the Tea-tree (*Thea Bohea*, fig. 509*a*) but have now no specimens. It is an interesting plant, which every child should know. It will live out of doors, but will not stand severe winters. I have also had the Camphor-tree (*Laurus camphora*, fig. 511*a*), but have not a specimen at the present time.

FIG. 511.—Balsam of Peru.

FIG. 511*a*.—Camphor-tree.

FIG. 512.—Acacia longifolia.

There are many beautiful species of the greenhouse Acacia, of which we have plants. We keep them in the turf-house during winter, and place them out of doors during summer. Many of the species are the most elegant of conservatory plants, and should be grown where there is sufficient space. The *Acacia longifolia* (fig. 512) is especially beautiful.

FIG. 513.—Fuchsia.

The Fuchsia (*F. triphylla flore coccineo*, fig. 513) is an exquisite flower from America, very readily grown, and easily propagated by cuttings, whilst new varieties may be raised from seed, or by hybridizing with other species, such as *F. fulgens*. The old fuchsia stands our winter if the plants are cut down and covered with from four to six inches of dry

ashes. They sprout in spring and form branches three or four feet high, covered with pendant flowers. This plan appears to be almost abandoned near London, but at Whitby and at other country places I have lately seen the plant grown in great perfection. It is usual to store the fuchsia plants in the back parts of greenhouses, as it is necessary to keep out immoderate or long-continued frost. Some of the florists' flowers have been obtained so large and misshapen as to be positively ugly.

I have a single Australian plant, the *Metrosideros speciosus* (fig. 514), amongst which the kangaroos in their native country delight to live. It gives a red blossom like a bottle-cleaner, which harmonizes well with its stiff dark green leaves.

FIG. 514.—Metrosideros speciosus.

FIG. 515.—Mimosa.

FIG. 516.—Cineraria.

We grow a sensitive plant, *Mimosa sensitiva* (fig. 515) every year, as it is easily raised from seed, and is a physiological mystery.

The Cineraria (fig. 516), an early spring flower, greatly adorns a greenhouse. The seed is sown in April in a pan, and the young plants are put into separate pots as soon as they are sufficiently large. They are kept in a cold frame during summer and in the greenhouse during winter, when they form charming decorative plants in early spring. The varieties of blossom are very considerable, but without care the plants are apt to be infested with aphides.

Another plant has been much varied by the florists' art, the *Impatiens Balsamina* (fig. 517). The seeds may be sown in pans in early spring, and the plants grown in cold frames in separate pots till blossom appears, when the pots may be transferred to the

conservatory. The flowers of some of the varieties are very fine, but after all they are not comparable with the wild flowers of the garden.

I have a very curious plant, the *Cuscuta reflexa* (fig. 517*a*) given to me by Mr. Terry. It is allied to the dodder, which destroys the clover. It is commonly a parasite on the ivy, but it is by no means nice as to the plant it patronizes, as it will grow on vines, peach-trees, geraniums,

FIG. 517.—Impatiens Balsamina.

FIG. 517*a*.—Cuscuta reflexa.

FIG. 518.—Rondeletia speciosa.

and in fact on whatever it can reach. When its stem touches a plant, it seems to form a union with the leaf or with the stem; so no doubt, leech-like, it sucks out its juices by dialysis. The flower is white, but the whole plant is not so handsome as the common dodder. It has no roots, but the stems simply twine round the plants from which it derives its nourishment. I have tried to acclimatize it on my ivy, without success.

We grow the *Rondeletia speciosa* (fig. 518), from the Havanas, but we do not look upon it as a very valuable acquisition.

FIG. 519.—Belladonna Lily.

There are many bulbous plants of great merit, such as the Belladonna Lily (*Amaryllis Belladonna*, fig. 519). It is said to be called Belladonna from the beautiful pale pink colour of the blossom. Like all the Cape bulbs, it must be grown in full light, and carefully ripened afterwards.

"Where, here and there, on sandy beaches,
A milky-bell'd amaryllis blew."—TENNYSON.

There is another bulb easily propagated by division, called the Whitby Lily (*Vallota purpurea*, fig. 520). Nearly every house in Whitby has specimens of this beautiful flower, which grows luxuriantly and flowers freely in an ordinary dining-room. We usually place our plants out of doors in the summer, and remove them to the turf-house in October. They will not bear frost: I once lost a fine stock by leaving them too long in the orchard-house, when the cold destroyed them. This lily flowers in October, and therefore is so valuable that many bulbs should be grown. The Jacobean Lily (*Amaryllis formosissima*) is another charming plant of similar character; but the whole of this class of bulbs require care and skill to grow them, to rest them, and to ripen the bulbs to ensure full success with their flowers.

FIG. 520.—Whitby Lily.

FIG. 521.—Cyclamen.

FIG. 522.—Mesembryanthemum.

Cyclamens (fig. 521) are very beautiful greenhouse flowers which blossom in early spring. To obtain them in the highest perfection care must be taken with respect to their growth and rest. The best plan is to sow the seed in March and transplant the little seedlings into separate pots; the next year they blossom well, and the succeeding year freely. The bulbs are then in their prime, although with care they will grow larger, and yield more blossom in future years. It is preferable continually to rely upon fresh plants rather than to continue in perfection very old roots.

I have between twenty and thirty species of *Mesembryanthemum* (fig. 522), which are mostly plants from the Cape of Good Hope. They may be planted out in summer in borders. In Italy and in the south of France these plants are much cultivated. One species is

used to clothe arid banks in the gardens near Naples and elsewhere, thus giving the effect of a grassplot. This class of plants, which has been much neglected, is useful in hot, burning situations, and will probably become fashionable with the higher class of gardeners.

We have a few Cacti. Notwithstanding their interesting forms and magnificent flowers, these plants are often discarded, because they are stubborn, and will flower when they like, and so are not well adapted for flower shows. This year several species were planted out

FIG. 523.—Echinocactus tubiflorus.

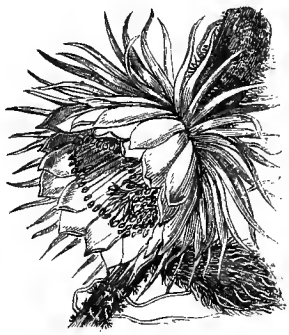


FIG. 524.—Cereus grandiflorus.

FIG. 524*a*.—Stapelia Plantii.

in a hot, dry border, and the one figured (fig. 523) shows well the splendour of their flowers. The Creeping Cereus is a common species, easily flowered. The Midnight Cereus (*Cereus grandiflorus*, fig. 524) comes into flower towards evening with great rapidity, and then may be cut, when it will last three or four days. Cacti are desirable plants to grow in greenhouses attached to dwellings, because they give off no odour. The Stapelia (fig. 524*a*) is a remarkable plant having flowers smelling like putrid flesh. Probably the Cactus-house at Kew is the most perfect glass-house in the world.

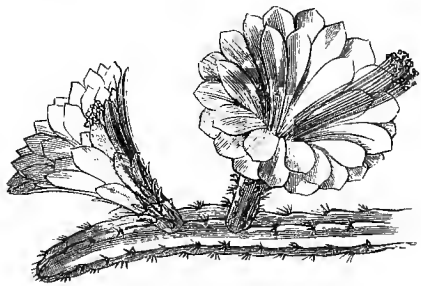


FIG. 525.—Cereus speciosissimus.

The *Cereus speciosissimus* (fig. 525) is a plant which created a great sensation when it was first introduced. Its grand, brilliant flower is most effective. It requires full exposure to sun, and a long season of

rest, when it flowers abundantly in spring, after a little water has been given to it. No plant is more easy to grow if the gardener wills it to succeed, but it is strange that few seldom have that will.

I have had the *Cochineal opuntia*, with the cochineal insects, but the punctures of these creatures caused the plant eventually to rot.

The *Epiphyllum truncatum* (fig. 526) flowers in winter: it is grown in our fernery. Its pink blossom and elegant form, at a time when flowers are scarce, make it a most valuable plant, which should never be dispensed with. A greenhouse in winter is almost too cold for it.

FIG. 526.—Epiphyllum truncatum.

FIG. 527.—Primula sinensis.

FIG. 528.—Primula denticulata.

The *Primula sinensis* (fig. 527) is an excellent spring greenhouse flower. There are many florists' varieties, and one raised by Paul is reputed to be exceedingly beautiful. The seed is sown in April, in a seed-pan; the young plants are transferred to pots, when they flower early in the next spring. There is a great difference in the quality of the blossom, according to the stock from which the seed is procured.

There is another primrose, nearly hardy, which is most easy to cultivate, the *P. denticulata* (fig. 528). We also always grow many plants of *P. Nepauliensis:* they are very interesting in early spring, when they send up numerous spikes of flowers. It is readily propagated by division.

There is a very remarkable plant called Venus's Fly-trap (*Dionæa muscipula*, fig. 529), which is one of the most curious of vegetable productions. At the end of each leaf is a trap, that closes the moment a fly touches it. The fly dies and decomposes, when the leaf opens again, and catches another. I have flowered the plant, have

seeded it, and have raised seedlings from it, and yet I am constantly without it. It is a bog plant, and difficult to grow. It is imported in quantities from abroad, and when the next large importation takes place I shall try several out of doors in an artificial bog, beside the *Drosera rotundifolia*. When recently on a visit to the Botanical Gardens at Edinburgh, I was delighted with the success which there attended the cultivation of this curious plant. The plants were grown in pots, immediately under the glass, so as to have full exposure to light: in fact, they were suspended from the roof. The pots were placed in a miniature bog: a plan which commends itself to our minds as approaching very nearly the conditions of their growth in their own country. As I have already said, it is one of the most curious plants in the world, and should be grown whenever it can be procured. The *Drosera dichotoma* is another interesting plant which I have grown.

FIG. 529.—Dionæa muscipula.

FIG. 530.—Darlingtonia californica.

FIG. 531.—Cephalotus follicularis.

There is a shrubby fly-catching plant from Portugal grown at Kew which I do not yet possess; and a still more marvellous fly-catching plant, *Darlingtonia californica* (fig. 530), which has hairs in the inside of a tube so arranged, that when the flies get in they cannot escape What the precise use of these fly-catching contrivances are, it is difficult to imagine, unless they nourish the plant; certainly they are amongst the wonders of the vegetable kingdom.

There is another very interesting greenhouse plant from New Holland, the *Cephalotus follicularis* (fig. 531). It is a bog plant, like Venus's Fly-trap, and it has grown well with me out of doors in

summer. Like all the bog plants, it is a difficult plant to grc mine frequently die. On the occasion of the next importa propose to attempt to acclimatize them, by growing them in a door bog.

There is a greenhouse water plant which should always be the *Aponogeton distachyon* (fig. 532). It grows freely in a] water with soil at the bottom, and it flowers abundantly in After flowering it deposits its seeds at the bottom of the pa numerous young plants arise. I have known it to grow out of it is killed by severe frosts: nevertheless, I shall attempt to matize it again, as, at the Botanic Gardens in Edinburgh, it in an open pond in the highest luxuriance, and is there a be aquatic plant.

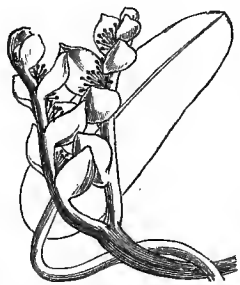


FIG. 532.—Aponogeton distachyon.

FIG. 533.—Vallisneria spiralis.

FIG. 533*a*.—Nympha

Another aquatic plant, the *Vallisneria spiralis* (fig. 533), w bi-sexual, and of which the female plant is almost exclusively in this country, is always cultivated in every greenhouse belon the microscopist. Under a high power of the microscope it sl circulation in each cell; and, particularly, Messrs. Powell and Le $\frac{1}{6}$th object-glass exhibits this feature in perfection. The p easily grown in common soil in a pan of water, and the litt flower upon a stem of two or three feet in length is very cu

I have grown the splendid *Nymphæa cærulea* (fig. 533*a*) with success in my vinery, as well as *Limnocharis Humboldtii*, and other aquatics; but water plants require full sunlight, or to be close to the glass, or they will not succeed. The vines, however,

much shade that I am now unable to cultivate them. Wherever full sunlight can be given, these charming plants should be grown. I know nothing more delightful than a greenhouse or stove pond, where we can be gratified by the observation of many of these aquatic beauties.

At the end of the orchard-house there is a simple glass shed, where there is abundance of air, and where our conservatory plants blossom in great magnificence. There are no means of warming the structure, but from March till October there is always abundance of blossom. Here the azaleas bloom in all their glory, and very much finer than they do out of doors in Italy. Here, too, the camellias flower, and afterwards the pelargoniums, lilies, and fuchsias. Here, in early spring, a few pot tea-roses gladden us with their welcome blossoms; we have at most times a blaze of the finest flowers at the minimum of cost, and the flowers are set off with hardy ferns growing in the greatest luxuriance.

STOVE PLANTS.

We have not a stove, yet we manage to grow one or two species in the cucumber house or in the fernery. *Torenia asiatica* (fig. 534) is a favourite flower of mine. It requires careful treatment, especially in winter, when it likes light and dryness, but when growing it requires more moisture. It has several times died out with me, but as it grows freely from cuttings, I have soon replaced it by others received from a friend.

FIG. 534.—Torenia asiatica.

FIG. 535.—Tradescantia discolor

Tradescantia discolor (fig. 535) is a common plant, growing as freely as a weed. It has, however, one of the most beautiful of all leaves, glistening like glass. It flourishes in the fernery, and is perhaps second

only to the lovely *Anœctochilus argenteus*. Another plant with beautiful foliage is the Variegated Pine (fig. 536). It is beautiful in leaf, but is still more lovely when in fruit: for the adornment of the dinner-table nothing can surpass it. This plant requires heat, but grows well in the cucumber-house.

FIG. 536.—Variegated Pine.

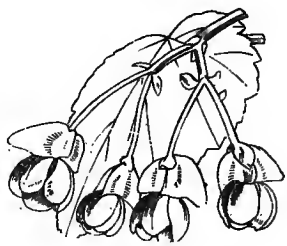


FIG. 537.—Begonia.

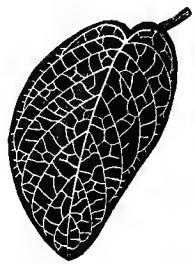


FIG. 537*a*.—Fittonia argyrea.

At different times we have had many species of Begonias. They have mostly been found larger than we could accommodate; nevertheless, the one figured (fig. 537) flowers well in the fernery, and is peculiarly adapted to that situation, as its red flower is ornamental.

Some of the Begonias have exquisite foliage. I have figured *Begonia rex* (fig. 538). At various times I have had many of these plants; and one particularly, the Climbing Begonia, is a very interesting addition to the garden.

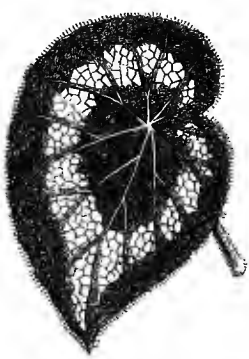


FIG. 538.—Begonia rex.

The different species of Marantas afford very fine foliage. The *Maranta zebrina* (fig. 539) is the most beautiful. In order to reach the highest perfection, it should be planted out in peat soil and grown freely, when its leaves attain their largest size and their finest colour. The *Maranta Warsawiczii*, *M. regulis*, *M. fasciata*, *M. micans*, *M. vittata*, and other species, have also beautiful leaves.

FIG. 539.—Maranta zebrina.

"As for the leaves, that in the garden bloom,
My love for them is great, as is the good
Dealt by the Eternal Hand that tends them all."
DANTE, *Paradise.*

There are many varieties of Croton which are exceedingly beautiful; of these the *C. variegatum angustifolium* (fig. 540) is most desirable, for the grace of its long narrow leaves, which are pendant. Small croton plants are very beautiful on the dinner-table.

FIG. 540.—Croton angustifolium.

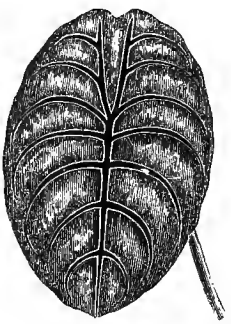


FIG. 541.—Alocasia metallica.

FIG. 541*a*.—Bertolonia maculata.

The *Alocasia metallica* (fig. 541) is another extraordinary plant from Borneo, which requires a stove temperature, and yields most splendid-looking leaves. It, however, occupies too much space in the limited stove-house which I possess. We have some beautiful dwarf variegated leaf plants, of which *Fittonia argyrea* (fig. 537*a*) and *Bertolonia maculata* (fig. 541*a*) are good examples.

Amongst the stove bulbs the Gloxinias (fig. 542) are easily grown, and present great varieties. They may be readily propagated by leaves which, when pegged upon the earth, form numerous little bulbs. Varieties can also be raised from seed. We propagate both kinds in the Cucumber-house,—the one with upright flowers, the other with drooping blossoms.

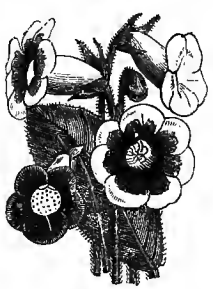


FIG. 542.—Gloxinias.

The Pancratiums are also charming hot-house bulbs. I have the *P. zeylanicum* (fig. 543), which grows well in my

glass fernery, and at Christmas time, when in flower, is so delicately beautiful that on one day it was the finest flower in the garden.

FIG. 543.—Pancratium zeylanicum.

FIG. 544.—Achimenes.

There is also another class of plants, the Achimenes (fig. 544), of which there are numerous varieties of different colours. They occupy almost too much space for us, yet certainly a few should be grown. They have little bulbs which can be preserved from year to year by keeping the pots free from frost.

Amongst the various plants having beautiful leaves, we may particularly note the Caladiums. They, however, take up much room, and therefore I have almost entirely discontinued their growth, as they exclude plants of higher merit. Nevertheless, their leaves are exceedingly beautiful, and perhaps one of the dwarf varieties, the *Caladium argyrites* (fig. 545), is the best adapted for private gardens. Their culture is easy, as they simply require warmth and moisture.

FIG. 545.—Caladium argyrites.

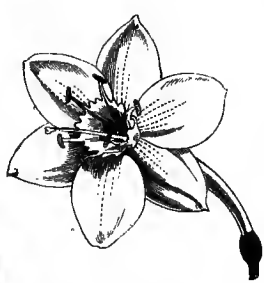


FIG. 546.—Eucharis amazonica.

There is perhaps no bulbous plant of recent introduction which adorns a stove-house more than the *Eucharis amazonica* (fig. 546), a lovely plant which has a white flower of surpassing beauty, much used at Covent Garden Market for nosegays. It requires stove heat: I lost

a fine plant by submitting it to greenhouse treatment during winter. The excellence of this charming plant is so great that it should never be absent from any gentleman's garden where there is a house having sufficient warmth for its growth.

One of the curiosities of the vegetal kingdom is the Semaphore plant, the *Desmodium gyrans* (fig. 547). Under favourable circumstances the *pinnæ* of the leaves move up and down in a manner similar to the semaphore by which telegraphic messages were transmitted before the voltaic battery gave to us the means of working the electric telegraph. I have watched with great interest the movements of this plant at Kew, and was so desirous to watch it again that I begged plants from thence and from the Botanical Society. Strange to say, however, in my garden I never till lately saw the plant move; but why it falsified its name I am totally at a loss to explain.

FIG. 547.—Semaphore plant.

We do not grow Stove Palms, as they require much space. It is interesting to plant date-stones, which readily grow, and soon make fair-sized plants. They require almost a stove temperature during winter, but will live out of doors in summer. The Date Palm will not grow further north than the shores of the Mediterranean, and even as far south as Naples it will not ripen its fruit, which perishes in winter. Palms and Cycads are very desirable plants for warm conservatories. At Bordighera, on the Riviera, beside the Mediterranean, the Palms are grown for the decoration of St. Peter's at Rome on Palm Sunday.

The Cape Jasmine (*Gardenia florida*, fig. 548) is one of the most highly and deliciously scented plants. I have had many fine plants, but they have always perished, because they require warmth at the roots and abundance of light. Those grown for the flower-markets are usually cultivated in a warm tan-pit immediately under the light. They are amongst the most charming of stove plants.

FIG. 548.—Gardenia florida.

Another stove-plant, *Poinsettia pulcherrima* (fig. 549), is very much employed for table decoration in London. The flower has a circle of bright scarlet bracts, which renders it showy, and it gives colour in the fernery in the winter time when colour is valuable. Except for these purposes it is not commendable. It flowers at the top of a straggling shoot, which causes the whole plant to be somewhat ungraceful. I find that the best plan is to turn the plants out of doors in summer and to place them in heat to flower in October.

FIG. 549.—Poinsettia pulcherrima.

Erasmus properly writes, that "one piece of ground will not hold all sorts of plants."

Loudon has described upwards of twenty thousand plants as being cultivated in England. It is manifest that no private garden could contain such a number; therefore a selection must be made according to the position and the opportunities afforded in each particular case. I have described those we more commonly grow, of which some are selected for their intrinsic beauty, as the primrose; some for their odour, as the violet; some for their rarity, as the *Cuscuta reflexa;* some for their curious contrivances, as Venus's Fly-trap; some for their associations, as the *Linnæa borealis;* some for giving us blossom under trees, as the foxglove; and many for affording us flowers at various and different seasons of the year. The plants which I have enumerated will suffice for most general flower gardens as a basis of plant growing; and if every year two or three other plants are added, the garden will have abundant attractions, and give every enjoyment which cultivation is capable of affording.

Looking at the range of plants which we cultivate, there is much to interest and delight us on our visits to the garden.

"And with childlike, credulous affection
We behold their tender buds expand;
Emblems of our own great resurrection,
Emblems of the bright and better land."—LONGFELLOW.

The flowers of our general garden merge into those of the alpineries on the one hand, and into our rosaries and ferneries on the other; whilst the climbing plants are distributed so as to be effective at all parts of the garden. The number which I have described is as large as can be fully observed or readily managed with my present appliances. The greater part of those which have been figured should never be omitted to be grown; but every year some novelty may be added, to prevent even the loveliest scene from becoming monotonous from the same picture being continually presented to the mind.

"I woll nat long hold you in fable
Of all this garden delectable,
I mote my tongue stinten nede,
For I ne may withouten drede
Naught tellen you the beautie all,
Ne halfe the bountie therewithall."—CHAUCER.

Vign. XXI.—Summer-house in my Garden.

Vign. XXII.—Scene from Bridge in my Garden.

CHAPTER XI.

SPECIAL FLOWER GARDEN, ETC.

"Bless me, what a delightful prospect is here! And so it ought to be, for this garden was designed for pleasure,—but for honest pleasure; the entertainment of the sight, the smell, and the refreshment of the very mind."—ERASMUS.

IN addition to the flowers which are grown in the general flower garden, it is usual for the floriculturist to have some speciality of his own, in which he takes particular delight. I must confess that I am a general lover of flowers, and do not concentrate my attention upon any one group. Nevertheless I have rosaries, climbing plants, orchids, and alpine plants, which are my special flowers.

THE ROSARIES.

"Salut, reine des fleurs, salut, vermeille rose!
A peine le matin a vu ta fleur éclore,
Que les jeunes zéphyrs, d'un doux zèle emportés,
Racontent ta naissance aux bosquets enchantés."—CHÊNEDOLLÉ.

Of all the florists' flowers,—that is to say, of all the flowers which have been altered in character by careful selection, and by the cultivation of the gardener,—the rose holds perhaps the first rank. Nine persons out of ten declare that it is their favourite flower; nevertheless I have looked at the wild rose over and over again, and asked myself whether, upon the whole, nature untouched is not far more perfect than nature improved by art. The Rose is used as a mystical emblem by the Church of Rome, to which Dante alludes when he writes—

"Here is the rose
Wherein the Word Divine was made incarnate.'

Pliny enumerates twelve varieties cultivated in Italy. What would he have said to the innumerable varieties which are now grown in our gardens?

Our cultivated roses are extremely beautiful, and we grow them in the greatest perfection. Roses are essentially plants of light and air, so much so, that they like to be exposed to the full light of the sun and to the air of heaven, and very ill bear the smoke of our London gardens, or even of the suburbs. But with light and air, and an annual top dressing of manure over the roots, they may be grown with ease and success. My garden yields roses nine months out of the twelve, and in the months of June and July tens of thousands of roses are in flower at the same time.

"Of roses there were great wone,
So faire were never in Rone."

There is a lovely little rose, the Rose de Meaux, which is one of the earliest to blossom in May, and is highly fragrant. It is delicate in its growth, but may be readily propagated by division, or rather by suckers.

Next in order of flowering come the Scotch Roses (fig. 550), which have many varieties of different shades of colour. They are beautiful twice in the year, first when covered with the otto-of-rose-like odoriferous flowers; and later, when the flowers are past, and are succeeded by their seed pods. The fancy of florists for Scotch roses is a thing of the past, but I have many plants, and no gardener should be without them, as they are most readily propagated from suckers, and are cultivated without any trouble. Formerly there were numerous varieties, but I do not know where they can now be procured.

FIG. 550.—Scotch Rose.

The Austrian Briars are so brilliant when in flower that they are distinctly visible across the garden. They are difficult to cultivate, and cannot bear the slightest taint of smoke, yet no garden should be without them. The Persian Yellow (fig. 551) is the best variety.

Provence roses are not much cultivated at the present time. The old Cabbage rose, so beloved by our forefathers, and the fringed Provence, should always hold a place in our gardens.

FIG. 551.—Persian Yellow Rose.

Damask roses afford us one or two good varieties, such as Madame Hardy and Madame Zoutman.

Rosa alba contains Madame Legras St. Germains, and Princesse de Lamballe.

Hybrid China roses have magnificent varieties in Blairii, Chênedollé, and Madame Plantier; and hybrid Bourbon roses afford us fine varieties in Charles Lawson, Coûpe d'Hébé, and Paul Ricaut.

However, all these blossom but once in the year, and therefore their growth is now proportionately disregarded for those roses which bloom, take a little rest, and then bloom again.

The Hybrid Perpetual rose, which originated from an artificial cross between the China and other roses with the Provence rose, flowers from June till frost puts an end to the blossom, and is the rose of the present day for the garden. The varieties of it are legion, as they have been raised from seed by horticulturists. The love for any particular florists' flower is subject to the caprice of fashion, and varies year by year. The pet of one period is the discarded one of another. The same rose to which the judges award a prize one day injures an exhibitor's chance another; but the wild flower satisfies the eye from century to century, and what delighted Horace and Virgil will continue to delight our grandchildren's grandchildren.

With regard to the innumerable varieties of hybrid roses, who is to decide upon their relative beauty? My verdict—not caring whether a variety is new or old—would differ from that of the rose-grower who delights in new varieties. In all matters of rose fashion I consult Mr. Wood of Maresfield, who grows many acres of roses. This eminent rose cultivator considers that at the present day the following twelve are the finest in cultivation:—

THE BEST TWELVE HYBRID PERPETUAL ROSES.

Alfred Colomb.	Eliza Boelle.
Aurore du Matin.	La France.
Baroness Adolphe de Rothschild.	Marie Baumann.
Charles Lefebvre.	Marquise de Mortmarte.
Duke of Edinburgh.	Prince Humbert.
Edwin Morren.	Xavier Olibo.

He has also marked 160 more varieties as indispensable, and many

FIG. 552.—Baroness Adolphe de Rothschild.

FIG. 552 *a*.—Duke of Edinburgh.

FIG. 553.—General Miloradowitsch.

he has not marked I should certainly not dispense with. These perpetual roses are beautiful when in bloom. We grow several hundred varieties of roses, and the best plan for the amateur is to commence with at least two hundred good kinds, and afterwards to add single specimens as his fancy may dictate. I have figured the Baroness Adolphe de Rothschild (fig. 552), of a delicate rose colour, Duke of Edinburgh (fig. 552*a*); General Miloradowitsch (fig. 553), light red;

FIG. 554.—Clovis.

FIG. 555.—Madame Barriot.

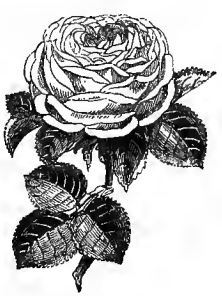


FIG. 555 *a*.—La France.

FIG. 556.—Centifolia rosea.

Clovis (fig. 554), bright red; Madame Barriot (fig. 555), carmine red

La France (fig. 555*a*); *Centifolia rosea* (fig. 556), bright pink; John Hopper (fig. 557), rose with crimson in the centre; and Marquise de

FIG. 557.—John Hopper.

FIG. 557*a*.—Marquise de Mortmarte.

FIG. 558.—Princess Louise Victoria.

Mortmarte (fig. 557*a*). I have also figured a new climbing hybrid perpetual rose, Princess Louise Victoria (fig. 558), introduced by Mr. Knight, Hailsham, Sussex. The tree has not yet flowered with me but it is reputed to be a very fine rose.

These varieties of hybrid perpetual roses are hardy in this country. At Wildbad in Germany they are said to be killed by the frost, and I was not a little amused one November to see all the heads of the standards bent down, and covered with earth for protection, while at that time my trees still yielded an occasional flower.

> "Gather therefore the Rose, whilst yet in prime,
> For soon comes age, that will her pride deflower."
>
> SPENSER, *Fairy Queen.*

New varieties are raised from seed, but it does not often ripen in this country, and many a seed must be planted before a good rose can be obtained. They may be multiplied by layers or cuttings, but the latter process is very difficult and uncertain. To propagate by cuttings, ripe wood is placed in a pot in a cold frame, for five or six weeks. This pot is then placed in a gentle hot-bed, when the buds will start and root. Scarcely one cutting in a hundred succeeds. Roses which are forced in pots in early spring yield cuttings the more likely to strike.

Owing to the difficulty in rearing cuttings, there are but few hybrid perpetuals on their own roots. The general mode of propagating any variety is by budding in summer. It is best performed after mid-summer, as soon as the buds are plump, and the bark will run from the

shoot. It is usual to place these buds either on the dog rose or on the mannetti stock. But the mannetti stock throws up suckers, which are a great abomination, as they rob the choice rose, and appropriate all the nourishment of the plant to themselves unless it is very carefully looked after, and the suckers removed by the gardener.

When we have obtained a hybrid perpetual plant, we have to decide how we are to grow it.

It is a common fashion to make a rose-tree look like a mop with the handle stuck in the ground. This form the gardener calls a standard, and he obtains it by working his rose on to a bare stick, about four feet high, of the common dog rose. This stick is rarely strong enough to sustain the weight of the head, but requires an iron staff, so that the mop head appears to come out of two sticks. At the top of this head branches of flowers arise. I have always disliked this mode of culture, and the more I observe it the greater this dislike becomes. I have gradually succeeded in looking on this unnatural mode of cultivation as a horticultural mistake, and so whenever my standards die I do not replace them. I cultivate my roses as pyramids from four to six feet high, and three or four feet across. The appearance of the tree here figured is surpassingly fine when covered with its perfect blossoms, and I think that no one who saw my pyramids would ever think of growing standards again.

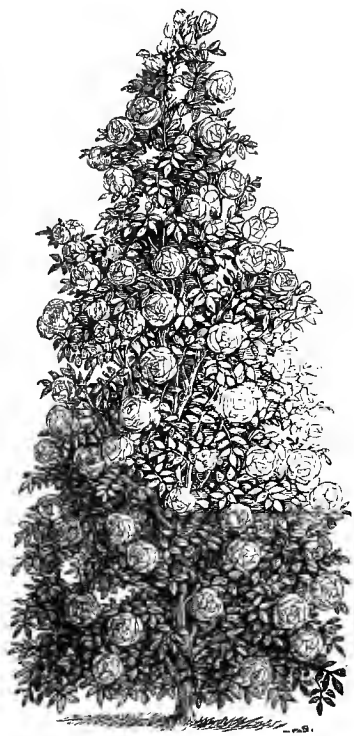


FIG. 559.—Pyramid Rose-tree.

One of these pyramidal perpetual rose-trees, grown on the Croquet ground (fig. 559), had at one time 144 blossoms open, and forty buds nearly ready to expand, besides which fifty more roses had either

fallen or had been cut; a number which no other mode of cultivating a tree could produce.

When we cultivate rose-trees on the mannetti stock we plant them deep, as then the rose itself frequently sends forth roots, and the stock perishes, an event much to be desired. The training of the tree afterwards is very simple. During the summer any very coarse shoot is topped by the finger and thumb, otherwise the tree is allowed to grow freely, and the shoots stand through the winter till the end of February or beginning of March, when they should be cut back. Where the ugly standards are grown they should be cut back to a prominent eye, but that eye should always point outwards. Where roses are grown as dwarfs, the shoots should be cut back to within a foot or two of the ground; but when we desire to grow a tree in the form of one of my beautiful pyramids, we cut it roughly in the shape of a Jack-in-the-Green, and maintain it thus, so far as we can, by summer pinching and spring pruning. It is advisable to cut rose-trees as late in spring as possible, as by this plan their flowering shoots come late, and then the blossom is finer. If they are cut too early, the shoots are liable to be damaged by frosts; and if cut too late, the trees are exhausted by taking off growing shoots. In this respect every season presents a difference; but by cutting the trees at the time of incipient growth, the gardener cannot fail to have a fine crop of roses.

As out of nothing nothing can come, so roses cannot be produced without a suitable manure. The best plan is to keep a good layer of manure over the roots all the summer, taking care that none is placed within six inches of the stem, as it is apt to injure it; but, as the manure looks unsightly on the ground, it is generally put on in the month of November instead of in the summer, for it will then rot and soak into the ground during the winter. Manure water in summer promotes the growth of rose-trees.

There exists a notion that wherever a good cabbage will grow a rose will grow; and as a cabbage loves an ample supply of manure, so a rose requires an equally rich soil and abundance of the food of plants.

Although at the present time gardens are chiefly embellished by hybrid perpetual roses, we ought not to forget how much they have been beautifully decorated by China roses, which blossom from May till Christmas. The common China (*R. indica*, fig. 559*a*) is most excellent in quality, and the two finest varieties, Lady of the Lake and Mrs. Bosanquet, are very beautiful. There is a tiny plant, with small flowers, called the Fairy Rose (fig. 560), which is utilized at Naples to form an edging round the outer rose-beds. The effect is pleasing, and I am propagating a number for use in the same manner. China roses are very easily propagated from cuttings, taken at the end of May, which are covered over with a glass and a little bottom heat applied, when flowering plants are obtained before the end of the year. China roses are as easy to strike as the hybrids are difficult.

FIG. 559*a*.—China Rose.

FIG. 560.—Fairy Rose.

FIG. 561.—Souvenir de Malmaison.

The Ile de Bourbon roses give us some fine plants, such as Acidalie, Baronne de Noumont, Catherine Guillot, Louise Margottin, and Rev. H. H. Dombrain. There is one variety of which it is quite necessary to have many plants, and that is the Souvenir de Malmaison (fig. 561). It flowers in perfection from August till late in autumn.

The Noisette roses are very fine, but they are delicate, and apt to be cut down to the ground in severe weather. The Cloth of Gold is an exquisite rose where it blossoms freely. I cannot, however, grow it at Wallington, although I have planted it many times; and the same may be said of Miss Gray. Celine Forestier, Lamarque, Lamarque à fleurs jaunes, Rêve d'Or, Solfaterre, and Triomphe de Rennes, are good varieties, but they are all too tender to grow except on a moderate scale.

Noisette roses (fig. 562) propagate easily from cuttings.

I did not know what a Banksian rose (fig. 563) really was till I saw it in flower at Florence, where both the yellow and white

FIG. 562.—White Noisette Rose.

FIG. 563.—Yellow Banksian Rose.

FIG. 563*a*.—Macartney's Rose.

varieties cover extensive surfaces. When they put forth their flowers in bunches with thousands of blossoms, there is hardly anything more beautiful to be seen. In this country they are apt to be killed down —even when the stems are as thick as the wrist—during severe winters.

The Macartney roses (*R. bracteata*, fig. 563*a*) produce a fine effect against a wall in summer, when their glossy foliage and their single flowers covered with bees is a glorious sight. I prefer the single to the double Macartney, which frequently does not open its flowers well. Neither have lived with me at Wallington.

> "About us thus,
> Of sempiternal roses, bending wreathed
> Those garlands twain; and to the innermost
> E'en thus the external answer'd."—DANTE, *Paradise.*

There is another fine group of roses, which are more beautiful and, as it were, more refined than the large hybrid perpetuals; namely, the Tea-roses. They are delicate, and are liable to be killed to the ground in severe winters if the gardener omits to protect them. Mr. Wood has marked for me at least forty-five varieties which he thinks necessary, and we have probably two or three dozen kinds always in cultivation. Some never grow, as the Vicomtesse de Cazes. Homère appears to be much hardier, and is easily forced in early spring, yielding abundance of flowers. Tea-roses should be planted in a light and rather dry soil,

and exposed to light and air, so that the wood may be thoroughly ripened; they also flourish in the orchard-house. Many tea-roses are in full flower when the hybrids have finished, especially the Gloire de Dijon (fig. 564)—the best of its kind, taking it all in all—which is the first to yield its flowers in spring, and the last to cease blossoming in winter: one planted in my orchard-house yields lovely flowers at times of the year when a single blossom is ever received with thankfulness; it is also a most vigorous grower, and will cover a summer-house; or it may be grown as a pyramid.

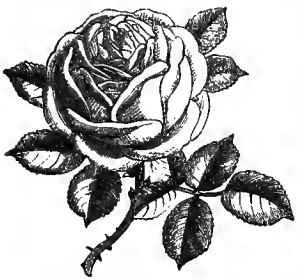


FIG. 564.—Gloire de Dijon.

FIG. 565.—Marshal Niel.

FIG. 565*a*.—Mademoiselle Marie Sisley.

Another rose which has been raised of late years, called Marshal Niel (fig. 565), is of exquisite beauty. I have planted it in many different situations out of doors, but without satisfactory success; either they have not given blossom, or they have been killed in winter. Mademoiselle

FIG. 566.—Climbing Devoniensis.

FIG. 567.—Moss Rose.

FIG. 568.—Félicité Perpetuelle.

Marie Sisley (fig. 565*a*) is a charming primrose-yellow tea-rose, much admired. The Devoniensis, and a rose resembling it, the Climbing Devoniensis (fig. 566), are eligible tea-roses for cultivation.

Moss Roses (fig. 557) are grown in our district in fields, whence the

flowers are sold in large numbers in the London streets. They are easily propagated by division, and require to be well manured. In spring it is advisable to prune the bushes freely back, when they will afford abundance of blossom. There are several varieties of moss roses: some white,—as Reine Blanche, Unique de Provence, White Bath, and Comtesse de Murenais; others rose and crimson,—as Baron de Wassenaer, Frederick Soulie, Gloire des Mousseuses, Lanei, and Marie de Blois. All these roses are beautiful in bud.

No one who has a wild garden can dispense with climbing roses. There are many kinds which should be trained into trees to form sheets of blossom in July. In some situations they can be trained over three iron rods arranged as a tripod; this effectually prevents their overthrow by the wind, which constantly happens when allowed to run up a single pole. They may be trained over banks, or roots, or outhouses, with equal effect. The Félicité Perpetuelle (fig. 568) occupies the same position with us in England as the Banksian rose occupies with the Italians. We have literally tens of thousands of flowers in the season,

FIG. 569.—Dundee Rambler.

FIG. 569 *a*.—Rosa canina.

FIG. 569 *b*.—Rosa spinosissima.

and the garden is never so lovely as when these are in bloom. Another rose, the Dundee Rambler (fig. 569), must not be omitted. Its flower is different in character from the Félicité, but it has its own peculiar charm. Wells's White rose is another fine climber, but it has not realized the character given to it by Mr. Wood, who considers it the most rapid climber known. Amadis is also a fine climber. Although we have many kinds of climbing roses which are good, yet the largest number of plants should invariably be of the Félicité Perpetuelle.

Notwithstanding the gorgeous colour, the exquisite shape, and the delicious perfume of many of the cultivated roses, I am by no means sure but that the harmony of leaf and blossom is not more perfect in the wild roses. Observe, for example, the perfection of the wild roses *R. canina* (fig. 569*a*) and *R. spinosissima* (fig. 569*b*).

We arrange our hybrid perpetuals in one long bed, containing 300 plants, beside the croquet lawn. Adjoining the croquet lawn we have our bed of tea-scented roses. Over the Central stream we have abundance of the Félicité Perpetuelle. On one side of the croquet lawn we have those splendid pyramids of which I have already discoursed.

Along the north border of the lake we have a series of about fifty magnificent bushes of hybrid perpetuals, and near the Overfall we have another group of all the kinds of roses, with Félicités covering the trees, so that we may say literally—

> "To shallow rivers, to whose falls
> Melodious birds sing madrigals;
> There will we make our beds of roses,
> And a thousand fragrant posies."
>
> SHAKSPEARE, *Merry Wives of Windsor.*

CLIMBING PLANTS.

"A thing of beauty is a joy for ever."—KEATS.

In all wild gardens climbing plants are essential to the general effect; and perhaps the common ivy is the most beautiful. The colour and marking of the foliage are exquisite, as it is seen creeping up a tree or paling when a young plant has grown from a bird-dropped seed. When it has entwined round a tree, it grips it with a fatal embrace, and sends forth its shoots to flower and seed; the seeds are then devoured by birds, which carry them to other parts. Many trees in my garden are covered with ivy, which is useful where a tree is not required to grow above a certain size. Branches of trees covered with ivy and planted in the ground will not grow; the ivy appears to be covered with rootlets, but they are evidently not real roots.

The manner in which ivy (*Hedera Helix*) insinuates itself into every crevice has been described by the poet:—

> "And the ivy knits it closely to its stanchions, and passes
> Through the crevices and hinges and the floor."—COLDWELL.

At other times the ivy, when it puts forth its flowering shoots, assumes the character of a tree, and a tree converted as it were into an ivy-tree is highly picturesque. We have many specimens.

Lastly, when ivy has nothing to which it can conveniently cling, it hangs down in wild festoons, which is nowhere better illustrated than at the waterfall at Dunkeld in Scotland.

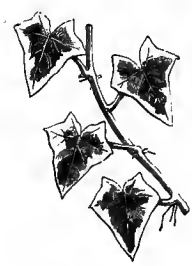


FIG. 570.—New Silver Edge.

FIG. 571.—Gold-striped.

The small natural ivy is far more beautiful than the large-leaved or Irish ivy; though that is useful for certain situations, and we use it to cover the brick retaining walls of the Backwater. There are many exquisite varieties of the ivy,—some with foliage splashed with white, others with gold and silver foliage, which are charming to grow over rootwork and stumps. I have figured four varieties (figs. 570, 571, 572, 573), but

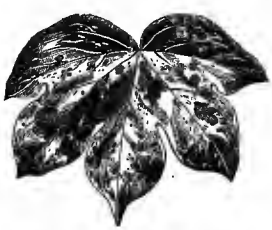


FIG. 572.—Old Silver Edge.

FIG. 573.—Elegantissima.

FIG. 573*a*.—Virginian Creeper.

where any extensive rootwork exists, as many varieties as can be procured should be grown, as each has its charm; though, taking all things into consideration, the common wild ivy of the woods is the most lovely of all. *H. Rægneriana* is fine for walls.

"I sat me down to watch upon a bank
With ivy canopied, and interwove
With flaunting honeysuckle."—MILTON.

In some places the Virginian Creeper (*Ampelopsis hederacea*, fig. 573*a*) is used with effect. In autumn, at Baden-Baden, where it is much grown, the leaves turn red. In this country the autumnal colour is rarely so fine, and I have almost, if not entirely, discarded the use of this climber at my garden.

A Convolvulus with rose-tinting in the flower (*C. Sepium*, var. *roseus*, fig. 574) is employed in remote situations. I was warned that it would prove to be a troublesome weed; however, the flower, like all the convolvulus tribe, is very beautiful, and I desired to see a few here and there. It is extensively grown in Scotland, where it is much admired.

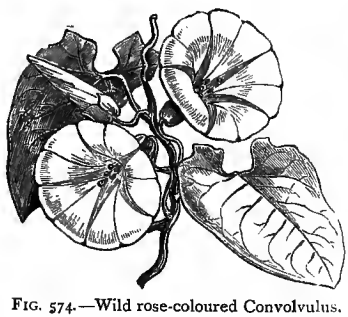


FIG. 574.—Wild rose-coloured Convolvulus.

FIG. 574*a*.—I. Horsfalliæ.

FIG. 575.—Glycine sinensis.

The Major Convolvulus, in all its varieties, should be grown in a few places out of doors. The *Ipomœa Learii* has a most magnificent flower. It has not been tried out of doors, and it likes to grow freely, as it is invariably attacked by the red spider. I have had one hundred flowers of this plant in blossom in a single morning, and nothing can compare with the grandness of the effect which was produced. The *I. rubro-cærulea* is a somewhat similar flower, which blossoms till late in winter. The *I. Horsfalliæ* (fig. 574*a*) has fine foliage, and, the flower being red, it is a desirable plant for the indoor fernery. It requires a stove temperature.

Amongst our out-door climbers the *Glycine sinensis* (fig. 575) is one of the finest for its blossom in May, but occasionally it is cut down by frost. On the road to the garden some of the largest

specimens round London exist: at Tooting a single plant completely covers the side of a large house, and in spring it is literally covered with thousands of flowers. Sometimes it is grown as a bush or tree, with good effect.

Occasionally the *Lithospermum scandens* (fig. 576) is grown, as it is admirably adapted for covering trellis-work.

The Sweet-scented Clematis (*Clematis vitalba*, fig. 577) should be in every garden. It is a variety of the Scentless, or Traveller's Joy, a wild plant which grows close to my garden. Its white, highly perfumed flowers are always welcome in August, and it is an agreeable addition to the summer-house.

FIG. 576.—Lithospermum scandens.

FIG. 577.—Sweet-scented Clematis.

FIG. 578.—C. Jackmanni.

"The clematis, the favour'd flower
Which boasts the name of virgin-bower."

SIR WALTER SCOTT.

Of late years the hybrid Clematis has contributed largely to the decoration of gardens. They should be grown so as to appear natural, for when they twine up trees spontaneously, producing sheets of their intensely blue flowers in August, nothing can be more beautiful. The *C. Jackmanni* (fig. 578) is in my judgment by far the finest of all. The *C. lanuginosa* (fig. 579) and

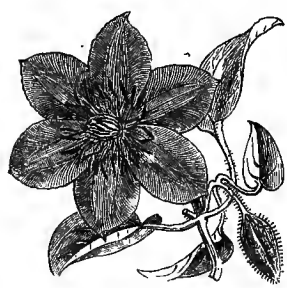


FIG. 579.—C. lanuginosa.

FIG. 580.—Pale Clematis.

the pale variety (fig. 580) are also fine, and there are some other beautiful kinds.

A garden is unworthy the name of a garden without fine plants of the Honeysuckle. The first which comes into bloom is the *Lonicera fragrantissima* (fig. 581), a small flower, highly scented, which blossoms in January, and continues through February and March: this should never be omitted. Then, later, we have a pale flower, deliciously scented, the Early Dutch (fig. 582); and later still, that magnificent variety the Late Dutch (fig. 583). The flowers of this variety have rich colour, the leaves are fine, and the scarlet fruit is equally ornamental. Neither the florist, the artist, nor the poet can ever dispense with this exquisite flower.

FIG. 581.—Lonicera fragrantissima.

"So doth the woodbine, the sweet honeysuckle,
Gently entwist."—SHAKSPEARE, *Midsummer Night's Dream.*

Following this, we have the Japanese Honeysuckle (fig. 584), which is remarkable for the veining of the leaves. It is perfectly hardy, and flowers with us, the flower being small and unimportant, but highly fragrant.

FIG. 582.—Early Dutch Honeysuckle.

FIG. 583.—Late Dutch Honeysuckle.

FIG. 584.—Japanese Honeysuckle.

It can be freely propagated by cuttings, and should ever have a place in the flower-garden. There is a honeysuckle which has delicious jasmine-scented flowers, but is easily killed in severe weather.

The *Jasminum nudiflorum* (fig. 585) flowers from November of one

year till March of the next. Its bright yellow flowers at such seasons are most lovely. It is well to plant it in a protected situation, to preserve it against excessive frost, but no garden can possibly do without it. We grow it under the protection of our summer-houses.

The common White Jasmine (fig. 586) exhales perhaps the most

FIG. 585.—Jasminum nudiflorum.

FIG. 586.—White Jasmine.

FIG. 587.—Cissus discolor.

exquisite of odours. It grows pretty well with me, but not so well as it does in other places. We have other jasmines in the fernery, of which *J. Sambac* is a desirable variety, as also is *J. grandiflorum*. We have likewise a variety with double blossoms as big as half-a-crown, and other species. All are beautiful and choice plants for the garden.

FIG. 588.—Cobœa scandens variegata.

In our glass fernery the *Cissus discolor* (fig. 587) surprises us with the beauty of its leaves. It is one of the most beautiful of all variegated-leaved plants, and in autumn and early winter is lovely.

The *Cobœa scandens variegata* (fig. 588) is a most elegant plant, as it hangs down from the roof of the fernery. However, it was found to be too exacting with respect to the space it required, and we were obliged to turn it out of the house.

When a blank space has to be covered in a glass house, we may

have recourse to the Creeping Fig (*Ficus repens*). It has small leaves, and it clings like ivy to a wall or to rocks, and it is useful in a situation where flowering climbers will not grow.

Several Tropæolums are grown at my garden. *T. Jarrattii* is a plant with a bulbous root; it flowers in the greenhouse in early spring. It requires cool treatment, otherwise it is apt to be attacked with the aphis and die down. It is interesting to see a little bulb, from the size of a marble to that of a hen's egg, throw out a slender stem, which grows till it completely surrounds a large wire globe, two feet in diameter, and then becomes covered with flowers at all points. There is another tropæolum, the *T. edulis*, which is sold as an esculent at the Palais Royal in Paris. I brought it over, but it has never blossomed. There are other tropæolums valuable for winter blossoming; and one, called Fire-ball, adorns the Poor Man's house in winter and in early spring, affording abundance of lovely blossoms. The plant, after its winter flowering, may be planted out of doors. It can be readily propagated by cuttings.

Whilst I was on a visit to Scotland, I was charmed with a climber which was trained to the wall of a manse in the valley of the Don. I had hardly uttered my praises when, with the natural kindness of the Scotch people, a plant was placed at my disposal. I brought it home in triumph, as pleased to receive it as the donor was to give it. It was the *T. speciosum* (fig. 589). It is a South American creeper, not in extensive cultivation, but, as I afterwards found, is for sale in the Scotch nurseries. It is a truly lovely climber, with a scarlet flower and slender stem; every garden should have a plant.

FIG. 589.—Tropæolum speciosum.

FIG. 590.—Canary Creeper.

The Canary Creeper (*T. canariense*, fig. 590) is a useful annual species for out-door growth.

A plant called the *Gloriosa* (fig. 591), which has a fine flower, and of which there are two varieties, is not often seen. I bought a bulb at Williams's nursery ground, which I planted, but a small Achimenes came up in its place. I naturally complained, when the worthy vendor

FIG. 591.—Gloriosa.

FIG. 591 *a*.—Tacsonia Van Volxemii.

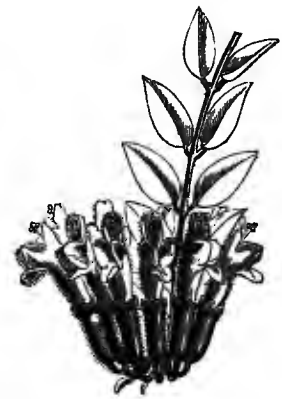


FIG. 592.—Æschynanthus.

replied that he could not tell the reason, but he would, with pleasure send me another bulb. To my astonishment, after a year's repose the bulb started, and grew vigorously; which is a curious physiological fact, and proves how long a bulb may rest and yet retain its vital power.

There is a pretty tribe of plants called *Æschynanthus* (fig. 592), which are admirably suited for growing in baskets to hang down from the pillars and top of the fernery. A species that has scarlet flowers, like all other plants that have flowers of that colour, is best adapted for that position.

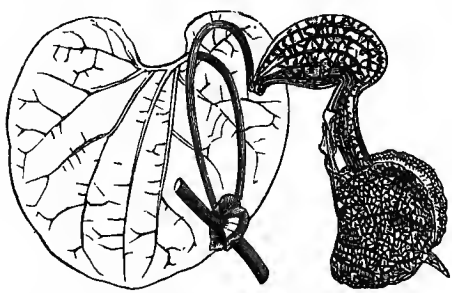


FIG. 593.—Aristolochia braziliensis.

We grow one remarkable plant in the fernery, the *Aristolochia braziliensis*, or *A. ornithocephala* (fig. 593), the flowers of which are so extraordinary as to astonish our visitors. The flower is so large, and so unlike any other, that it is impossible to describe it; its surface is

covered with markings like a calico print. One day, when the plant was in blossom, I led some of my visitors to suppose that the flower might be artificial, and I assured others of its reality. I afterwards found both parties carefully examining the plant, and neither could decide whether the flower was a real one or a mere sham made for the purpose of practising a joke upon them.

We have never succeeded well with the *Clianthus Dampieri* (fig. 594), which evidently requires very special treatment, and appears to be impatient of a damp atmosphere. The colour of its flowers is magnificent.

It is impossible to dispense with Passion-flowers. Perhaps one of the most useful species is the *Passiflora kermesina* (fig. 595), which flowers all the year round. The young wood, which is slender, hangs down with a flower or flower-bud growing from the axil of every leaf. Next to it in beauty, and perhaps even more brilliant in colour, is the *P. racemosa*. Racemes of scarlet flowers hang down over green ferns, and set off a fernery by affording the complementary colour to the green which is so essential to a perfect effect. The *P. cælestina* is fine. I grow also *P. Bellotti*, *P. macrocarpa*, *P. quadrangularis*, and the small but interesting bat's-wing leaf white flowering species, but this latter is always distasteful to gardeners because it is not sufficiently showy. The best Passifloras to grow are *P. kermesina* (which is *P. dentata*), *P. racemosa*, *P. cælestina*, and *P. quadrangularis*. The *P. cærulea* has been frequently tried out of doors, and as frequently has died in winter. On the high ground near Croydon it grows well, and becomes covered with its beautiful golden fruit; but even there it will not stand the cold in our

FIG. 594.—Clianthus.

FIG. 595.—Passiflora kermesina.

severe winters. The edible fruit of two species (figs. 384 and 385) are shown amongst the fruit-trees.

Allied to the passion-flowers, the *Tacsonia Van Volxemii* (fig. 591*a*) must not be forgotten. Each scarlet flower depends from a pedicle six inches long, and the effect is splendid. It managed one year to creep out of the fernery through a crack, and grew over a cherry-tree, whence the flowers depended naturally. I have seen the *Tasconia Buchanani*, or *Passiflora vitifolia* exhibited. It has leaves more like a passion-flower than a Tacsonia, but it has not as yet flowered with me.

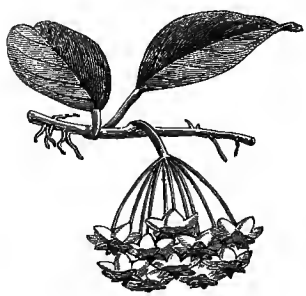


FIG. 596.—Hoya carnosa.

In the fernery I have many species of Hoya. The common *H. carnosa* (fig. 596) is perhaps the best of all, and is a climber of large dimensions, and there is also a variegated form of this plant. *H. bella* (fig. 597) and *H. Paxtoni* are exquisite small-growing species, with flowers highly scented; of which a preference may be given to the first-named; but it is difficult to keep in winter, as it is apt to rot at the root. The *H. imperialis*

FIG. 597.—Hoya bella.

FIG. 597*a*.—Hoya campanulata.

FIG. 598.—Combretum purpureum.

is a large flowering species, and we grow others; but *H. bella* and *H. carnosa* are indispensable. *Hoya campanulata* (fig. 597*a*) is grown by Mr. Lawrence at Beddington in great perfection.

The *Combretum purpureum* (fig. 598) is a handsome creeper, but it does not always grow freely, and without care is liable to be attacked with the red spider. It requires a damp atmosphere.

We grow two Clerodendrums: one, the *Clerodendrum splendens* (fig. 599), which has splendid scarlet flowers, invaluable for a fern-house; another, the *C. Balfourii* (fig. 600), which flowers in the fern-house about midsummer.

FIG. 599.—Clerodendrum splendens.

FIG. 600.—C. Balfourii.

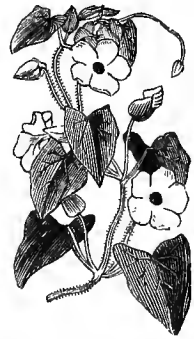


FIG. 600 *a*.—Thunbergia alata.

Wherever a southern aspect can be afforded, no plant can surpass the *Stephanotis floribunda* (fig. 601). Large quantities come to Covent Garden Market for wedding bouquets. The plant has a pure white blossom, and no garden can dispense with such an exquisite flower. It does not grow very well in my fernery, which has a northern aspect.

FIG. 601.—Stephanotis floribunda.

FIG. 602.—Mandevilla suaveolens.

FIG. 602 *a*.—Bougainvillea speciosum.

A lovely climber, which should be absent from no garden, is the *Mandevilla suaveolens* (fig. 602). The *Bougainvilleas* (fig. 602*a*) are extraordinary flowers of considerable beauty. They require, however, space for their successful culture.

The *Stigmaphyllon ciliatum* (fig. 603) is one of the best of indoor climbers, and flourishes well in the coldest part of the fernery, where its bright yellow flowers are most welcome, resembling as they do the finest orchid. It is certainly a most exquisite plant, and by no means common.

FIG. 603.—Stigmaphyllon ciliatum.

FIG. 603*a*.—Hop.

FIG. 604.—Abutilon vexillarium.

The *Abutilon vexillarium* or *A. Megapotamicum* (fig. 604) is another showy climber, which produces abundance of flowers in the cool part of the fernery. The only care it requires is to keep the plant within reasonable dimensions. It is easily propagated by cuttings.

We have grown at times many Thunbergias. The common ones—the *Thunbergia alata* (fig. 600*a*) and *aurantiaca*, with their beautiful varieties—are the abomination of gardeners, because they say that they are readily infested with insects; but that is only the case when the plant is not grown sufficiently fast. The *T. fragrans* is a charming plant for the fernery, and not very common, and *T. laurifolia* (fig. 605) is above all praise, for in the months of December and January it yields delicate blue flowers which are extremely ornamental.

FIG. 605.—Thunbergia aurifolia.

A variegated-leaved vine has lately come into use, but although it looks pretty in pots I have found it worthless out of doors.

A Yam with richly-coloured leaves has been grown, but I cannot say that it is a desirable plant, and do not recommend its cultivation.

The Hop (fig. 603*a*) is a very ornamental climber in certain situations; we, however, do not grow it in its cultivated varieties, although we find it a very troublesome weed in our hedges.

The *Lapageria rosea* (fig. 606) is a fine plant, which is nearly hardy. It has stood in my orchard-house without its roots being destroyed, and I am trying it out of doors; but although it survived last winter, I cannot yet tell whether it will succeed. It has noble, fleshy flowers and stiff leaves.

FIG. 605.—Lapageria rosea.

We have a plant of the *Dipladenia amabilis* (fig. 607), which has large showy flowers; and also a plant of the *Allamanda Hendersonii* (fig. 608), which has large brilliant yellow flowers. Both these are considered by the floral world as really good flowers to be exhibited at flower-shows, but neither of them can compare in beauty with many of the

FIG. 607.—Dipladenia amabilis.

FIG. 607*a*.—Calystegia pubescens.

FIG. 608.—Allamanda Hendersonii.

other kinds I have mentioned, which never go to flower-shows. But the fashion of the period and flower-shows have to answer for much of the deterioration of gardens.

Climbing roses must not be omitted from our list of climbing plants, as they are very useful to cover dead trees. A very beautiful plant for covering low trellis-work is to be found in the *Calystegia pubescens* (fig. 607*a*) from China; which bears an abundance of pink and white blossoms about the size of a crown-piece.

I must confess that no little contrivance is needed to have so many

climbers over the roof of my fernery, and yet to admit sufficient light for the ferns. A single climber might be grown to cover the roof; nevertheless a change of foliage and a variety in form and colour are so delightful, that the perfection of growth is sacrificed to variety, and we prefer to wander with admiration from one lovely form to another rather than to obtain perfection by giving to every beautiful species its just due.

"But who can paint
Like Nature? Can imagination boast,
Amid its gay creation, hues like hers?
Or can it mix them with that matchless skill,
And lose them in each other, as appears
In every bud that blows,"—THOMSON'S *Seasons*.

MY ORCHIDS.

"Yet Spring's awakening breath will woo the earth,
To feed with kindliest dews its favourite flower,
That blooms in mossy banks and darksome glens,
Lighting the greenwood with its sunny smile."—SHELLEY.

Many persons speak of Orchids as eccentric plants, to be looked upon with wonder, not with admiration; yet I must confess that, in my opinion, they are, in form and colour, the loveliest of all the lovely plants which adorn the woods and fields. Although some of the European orchids are particularly beautiful, yet it is in the tropical species that the full glory of these plants is displayed. Of our British orchids twenty-eight species are recorded as growing in the county of Surrey alone. A few have been found in the fields near us, and more are found on the neighbouring chalk downs. Nearly all British orchids are terrestrial, and have bulbs or quasi-bulbs.

First and foremost, I grow the common orchid (*Orchis mascula*, fig. 609), which abounds in Kent, and indeed in most parts of the kingdom. It flowers in April and May, and is so beautiful that many should be grown. I procure them by digging the roots from the hedgerows in February and March, before the flower appears. Although many have flowered in the highest perfection and have seeded every year, yet I have never known them to multiply; nor can I tell how

to increase them, although they grow, blossom, and seed so well in my garden.

I am always anxious to have some Bee Orchids (*Ophrys apifera*, fig. 610), as a group of these plants is very beautiful, but I never obtain as many as I should like, although the species has been found immediately outside my garden, in fields in my occupation. They blossom with me in the very highest perfection when grown in top-spit loam.

FIG. 609.—Orchis mascula.

FIG. 610.—Bee Orchid.

FIG. 611.—Fly Orchid.

The Fly Orchid (*Ophrys muscifera*, fig. 611) is another lovely species, but much as I admire it I never cultivate many. They grow in the very highest luxuriance in my alpinery, with the curious Bee Orchid.

FIG. 612.—Man Orchid.

FIG. 613.—Great Butterfly Orchid.

FIG. 614.—Orchis maculata.

The Man Orchid (*Aceras anthropophora*, fig. 612) is another curious flower, but not so beautiful as the last two. It is called the Man Orchid because the flower has a resemblance to a little man dangling in the air. These grow on the southern side of our chalk downs, whence I obtained my specimens.

I cultivate also the Great Butterfly Orchid (*Habenaria chlorantha*, fig. 613) and the Spotted Pale Orchid (*O. maculata*, fig. 614); also the

common Marsh Orchid (*O. incarnata*, fig. 615). I should grow many other species, and have them by hundreds, but that I am neither able to procure them, nor to spare the time to search for them. Some of my plants, during the last two or three years, flowered in great perfection, and then suddenly died, but whether from exhaustion or not I cannot tell.

FIG. 615.—Orchis incarnata.

FIG. 616.—Goodyera repens.

FIG. 617.—Cypripedium Calceolus.

When in Scotland in 1871, I found *Goodyera repens* (fig. 616) in abundance, and brought home many plants. I also found considerable quantities of the *Listera cordata* in the valley of the Don. The *Cypripedium Calceolus* (fig. 617) is one of the most beautiful of our rare English flowers. It has never done well in my garden; neither has the beautiful *C. spectabile* from North America; but both are choice flowers, ever to be grown where they will succeed. Quantities of these flowers might be obtained at a cheap rate from America.

For all terrestrial orchids I use a light turfy loam, which appears to suit them better than any other material. There are many other South European kinds, growing in Italy and Greece as thickly as buttercups do in our fields, which doubtless, if they were imported to this country, would readily find purchasers. The Comte de Paris is a great admirer of these lovely flowers, and has exhibited many collected by him in Spain and elsewhere. So common are the terrestrial orchids in the Boboli Gardens at Florence, that in some parts of the Royal grounds there are almost more orchids than grass. I persuaded the gardener,

by signs, to give me a number of roots, but they did not grow well in my garden.

The more splendid forms of orchids are not terrestrial, but epiphytic, growing on trees and rocks in their native country. The roots cling closely to the trees or rocks, and for that reason are called air plants; but I suspect that they draw much nourishment, and especially earthy salts, from the plants on which they grow. During their period of growth a nearly saturated atmosphere is absolutely necessary; and at all times of the year it is desirable that the air should be very humid. Probably more orchids are killed by excess of heat, and a daily variation of the dryness of the air, than from any other cause. They will not bear a dry atmosphere, and heat combined with dryness causes certain death. I do not pretend to grow exotic orchids, but I never refuse a spare bulb from a friend. They grow with me like weeds, and so by the gifts of many kind friends I have now more plants growing, in good health than existed in the country when I was born. The secret of my success is to supply water by giving moisture to the air, and not to soak the roots of the plants. The greater part of my orchids are grown in the fernery, and the highest temperature which any of my plants get is that which is necessary for the growth of cucumbers. Some of them, as the Cypripediums and *Dendrobium nobile*, are grown in winter at a temperature very little above freezing, and indeed occasionally they may get a little frost, which, however, is to be avoided rather than to be commended. All the epiphytic orchids shun the direct rays of the sun, but rejoice in light. They never do well in a large house, probably because the hygrometric state constantly varies. The part of my fernery in which the orchids grow has some light admitted from the south; but rows of trees are planted before the glass, effectively to intercept the direct rays of the sun in summer, though some of the rays in winter are beneficially admitted.

Most orchids do best if potted in broken pieces of pots intermingled with the fibre of peat and sphagnum moss. By this mode of growth the roots are always freely exposed to air and moisture.

Of all orchids, the Chinese (*Dendrobium nobile*, fig. 618) is perhaps the best for all its qualities. It will grow in the vinery during the summer, though it likes at that time more heat. It rests in winter, in any greenhouse where frost is kept out. In advancing spring every stem puts forth numerous buds, which blossom from February to May.

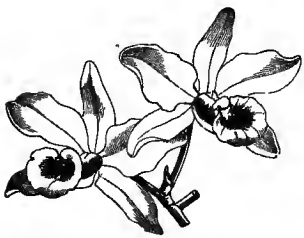


FIG. 618.—Dendrobium nobile.

FIG. 618*a*.—Disa grandiflora.

FIG. 619.—D. Pierardii.

The *Disa grandiflora* (fig. 618*a*) is a noble orchid which I hope to possess, and the *Lælias* (fig. 620*a*) are of exquisite colour.

We grow many other Dendrobiums. The *D. Pierardii* (fig. 619) has bare stems, clothed with sheets of flower in the spring, and many other beautiful species (fig. 620) adorn my fernery.

The *Phalænopsis grandiflora* (fig. 621) is another magnificent orchid with white flowers on a long stalk. It is always in flower; whether

FIG. 620.—Dendrobium.

FIG. 620*a*.—Lælia anceps.

FIG. 621.—Phalænopsis grandiflora.

the abundance of flowers destroys it or not I cannot tell, but notoriously these plants soon die. I had two given to me which grew for some years, but lately they have shown signs of loss of health. They require the temperature of the cucumber-house all the year round, and they evidently need some particular treatment with regard to their rest and growth which is not rightly understood.

I have one or two Vandæ which are thoroughly exotic in character. The *Vanda tricolor* (fig. 622) and other species require all the heat of the cucumber-house for their growth. The genus Oncidium, of which many species grow well with me, affords us many beautiful flowers. The *Oncidium papilio* (fig. 623) has a flower like a butterfly resting upon the top of a stalk. One flower follows another, and the same stalk after

FIG. 622.—Vanda.

FIG. 623.—Oncidium papilio.

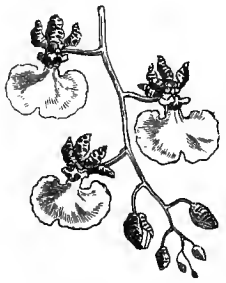


FIG. 624.—O. altissimum.

a period of rest forms other flowers; so that this beautiful, curious plant flowers afresh many times in a year. It does well in the fernery, and forms fine bulbs in that situation.

Some of the species of Oncidium form flower-stalks four or five yards long, and I myself have one which has spikes three yards in length. It is interesting to watch the growth of *O. altissimum* (fig. 624).

FIG. 625.—Oncidium flexuosum.

FIG. 626.—O. Harrisii.

FIG. 626 *a*.—O. luridum.

The flower-spike grows its full length, and then at every joint the flowering spikelets come forth, so that the whole of the long spike is clothed with beautiful flowers at the same time.

O. flexuosum (fig. 625) is a pretty Brazilian species. It likes the

warmth of the cucumber-house; but *O. Harrisii* (fig. 626) grows freely in the fernery, and sends up lovely spikes about a foot long. *O. luridum* (fig. 626 *a*) and *O. ampliatum* (fig. 626 *b*) grow also freely with me.

There is a curious plant which flowers well with me, but it is not common; it is called *Mantisia saltatoria*, or Opera Girls (fig. 627). The flower has a fanciful resemblance to a ballet-girl dancing. Its stems die down in winter, and send up their flowers in spring, which last long into the summer. The plant is more curious than beautiful.

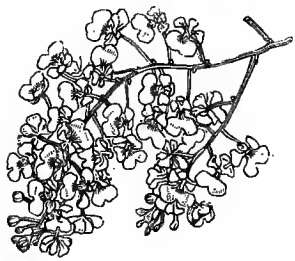


FIG. 626 *b*.—O. ampliatum.

FIG. 627.—Mantisia saltatoria.

FIG. 628.—Phajus grandiflora.

Another terrestrial orchid of great beauty is the *Phajus grandiflora* (fig. 628). It forms its bulbs in summer, rests during winter, and in early spring sends forth a fine spike of exquisitely coloured and

FIG. 629.—Cattleya Mossiæ.

FIG. 630.—C. Skinneri.

FIG. 630 *a*.—C. crispa.

formed flowers. It is a lovely species, and requires little attention in its cultivation.

Central America has yielded to us the Cattleyas, which afford flowers of astonishing size. I have *C. labiata*, *C. Mossiæ* (fig. 629), *C. Skinneri*

(fig. 630), *C. crispa* (fig. 630*a*), and *C. Forbesii*. They are fine, and they have the rare merit of not requiring excessive heat. The bulbs must be ripened to insure perfection of flower. Cattleyas are stock flowers for the horticultural shows, and the poor plants suffer terribly from the tricks played upon them, either to hasten their blossom by heat, or to retard it by cold, so that they may be exhibited by a given day.

The Maxillarias, or flowers with jaws, are a remarkable class of plants. I have several species, of which *M. Harrisonii* is one of the most beautiful. The *M. fimbriata* (fig. 631) has abundance of singular

FIG. 631.—Maxillaria fimbriata.

FIG. 632.—Lycaste aromatica.

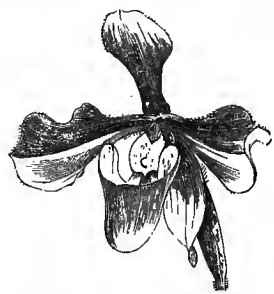


FIG. 633.—Cypripedium villosum.

blossoms; and an allied species, the *Lycaste aromatica* (fig. 632), is remarkable for the great number of flowers which are produced, and for their fine aromatic odour.

We have three or four species of Cypripediums, many of which anyone who has a warm greenhouse may grow. The *C. insigne* and *barbatum* are the most common species and most easily cultivated, but of late years many others of the highest merit have been introduced. The illustration is taken from a species grown by Mr. Terry, called *C. villosum* (fig. 633); but many others of even more beauty are now cultivated. *C. caudatum* is a very remarkable and interesting species, but which I do not at present possess.

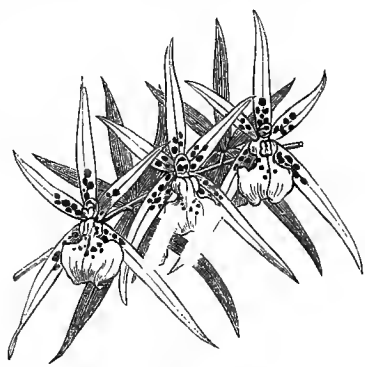


FIG. 634.—Brassia macu

We have a plant from Jamaica, the *Brassia maculata* (fig. 634). It grows freely in the fernery, and flowers well.

Perhaps, however, to a person unacquainted with orchids, nothing is more surprising than to see a number of bulbs, some with leaves and some without, planted in a wire basket in moss, and protruding from the bottom a spike having four or five large flowers. This is the case with the *Stanhopea* (fig. 635). I remember that when Mrs. Lawrence showed a specimen, many years ago, it caused a sensation; but the plants are now quite out of fashion, and some orchid-growers who love prizes more than their plants will not have them in their houses. They grow very readily, but they have one disadvantage, that is, the flowers last but a few days instead of several weeks, as the flowers of other orchids do.

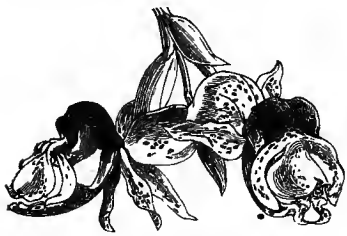


FIG. 635.—Stanhopea.

FIG. 636.—Aërides crispum.

I have one or two species of *Aërides* (fig. 636), which are fine, and, like the Vandæ, they require much heat. I have two or three species of Epidendrum, which I need not describe.

The beautiful genus of Anæctochilus (fig. 637) is represented in my garden by two species. The *A. argenteus* has perhaps the most beautiful leaf of any plant known; and the *A. Lowii*, from Borneo, is a grand species. In noticing these I could not resist giving a figure of the ten species now grown by Mr. Terry, who is very successful in the cultivation of these valuable plants, and who has perhaps the finest collection in the country. They are difficult to cultivate, and like a moist atmosphere. The only two species which I possess grow in the greatest luxuriance.

The *Calanthe vestita* (fig. 638) is a plant very easily cultivated; I find it grows as readily as any orchid. It forms large bulbs in summer, and about Christmas begins to form its flower-spikes, which grow to a length of from one to two and a half feet, and in winter are covered with beautiful flowers. By having many plants, the period during

which they blossom may be prolonged for a considerable time. There are many varieties, differing in the colour of the flowers.

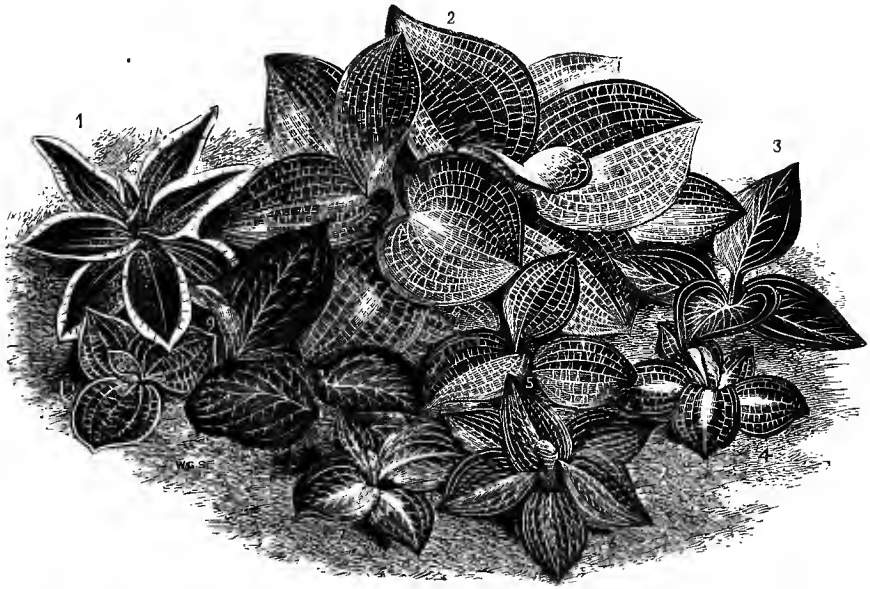


FIG. 637.—1. Anæctochilus argenteus, Brazil; 2. A. Lowii, Borneo; 3. A. ordiana; 4. A. (macodes) petola, Java; 5. A. xanthophyllus, Ceylon; 6. A. argenteus pictus, Brazil; 7. A. setaceus intermedius, Ceylon; 8. A. Veitchii, Java; 9. A. Dawsonianus, East Indies; 10. A. setaceus, Ceylon.

The Odontoglossums are glorious flowers from Central America. The *O. grande* (fig. 639) is a magnificent plant, and requires only a moderate temperature: in fact, much heat destroys the plant. The

FIG. 638.—Calanthe vestita.

FIG. 638*a*.—Tricopilia tortilis.

FIG. 639.—Odontoglossum grande.

O. Alexandriæ (fig. 640) is also a superb flower, and deserves to be largely cultivated. The *O. pulchellum* has a pretty little white flower. I have a fine plant of the very beautiful *O. Phalænopsis* (fig. 641), that was given to me by Mr. Gassiot: it grows well in the fernery.

The odontoglossums do not like too much heat, but plenty of light, without the direct sun.

The *Tricopilia tortilis* (fig. 638*a*), from Mexico, is remarkable for the twisted character of the petals of its flower. It grows in the fernery.

FIG. 640.—O. Alexandriæ.

FIG. 641.—O. Phalænopsis.

FIG. 642.—Miltonia.

The Miltonias (fig. 642) yield very exquisite flowers. They are not easy to grow, and require heat. My plants have not done very well.

There is a plant much appreciated by the Spaniards, who call it the Dove Orchid, or Holy Ghost Orchid (*Peristeria alata*, fig. 643). It grows freely in the cucumber-house, and forms bulbs as large as a turkey's egg. From the bulb one or two flower-stalks rise, about three feet high, from which a thick, fleshy white flower grows; the middle of this in shape resembles a dove. It is upon the whole a flower more curious for its associations than for its beauty, and a single plant is sufficient as a specimen.

FIG. 643.—Dove Orchid.

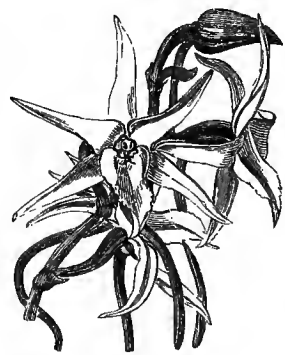


FIG. 644.—Angræcum sesquipedale.

I have not at present an *Angræcum sesquipedale* (fig. 644): it has a white blossom, and it is remarkable for its having a long appendage, which the crickets delight to eat, making the flower look ridiculous.

There is another plant which has lately been introduced, the *Masdevallia Veitchii* (fig. 645); this is also a remarkable plant, and is a desideratum for the orchid-house.

FIG. 645.—Masdevallia Veitchii.

FIG. 646.—Vanilla.

FIG. 647.—Cælogyne cristata.

Everybody is acquainted with the powerful odour and intense, penetrating flavour of the Vanilla (*Vanilla aromatica*, fig. 646), but everyone does not know that it is the produce of a climbing orchid. It sends down roots six or eight feet long, from the roof of the house to the ground. The fruit, which is a long pod, is used for flavouring purposes. I received my plant from Mr. Terry, who has fine specimens. It rarely fruits in this country, though fine pods from Sion House have been shown. The plant itself requires full exposure to the sun to mature it, and I have seen it in fruit at the Horticultural Gardens in Florence, where no doubt the powerful Italian sun contributes to perfect the fruit in the hot-houses there.

There is a very beautiful orchid, the *Cælogyne cristata* (fig. 647), from Nepaul, which thrives well in my fernery. It forms its bulbs during the summer, and soon after Christmas sends up its flower-spikes, that hang gracefully over the sides of the pot in which it is planted. It is a very charming plant.

The Pitcher-plants are the universal concomitants of an orchid-house. The oldest and best-known one, the *Nepenthes distillatoria*, was nearly lost, and had become very scarce a year or two since. I have had this variety, and now possess *N. levis*, which forms its pitchers well. The *N. ampullacea* is the most noble, having pitchers of pro-

digious size. What may be the use of these pitchers, which at times are full of water, nobody can tell. The *N. Rafflesiana* (fig. 648) is another fine plant. They are difficult to grow, and must never be allowed to get dry, or they are sure to perish.

Fig. 648.—N. Rafflesiana.

It is a great treat to see Messrs. Veitch's collection of Pitcher plants, which is perhaps the finest in Europe. There is a grace of form about these plants, n addition to their strange incomprehensible structure, which delights the mind. Who that is able to grow a pitcher plant would ever be without one?

The Saracenias, which are low pitcher-plants, are also curious, and have remarkable flowers. However, I have had them over and over again, though they have after a time invariably died; for, as in the case of all bog plants, it is difficult to give them their natural conditions. I am inclined to think that many species would grow out of doors, and when the next large importation takes place I shall feel great curiosity in trying to acclimatize them.

Those who cultivate orchids generally love them very much. They are all natural plants, and, with very few exceptions, have not been impaired by the skill of the floriculturists. In a well-stored orchid-house one can see as many plants in a few minutes as could be observed by travelling thousands of miles; and those who have seen orchids abroad tell me that their blossoms are, in cultivation, even finer than when growing in their native woods. Nevertheless, there is hardly any joy without some sorrow, and the penalty of orchid-growing is the necessary exposure to the hot damp atmosphere in which they live,—that it is not consistent with the health of human beings. Nothing, however, can be more pleasing or more enviable than the possession of a well-appointed orchid-house. Even with my comparatively limited collection there is not a day in the year that a few exquisite flowers are not in bloom.

ALPINE FLOWERS.

"Avec leurs grands sommets, leurs glaces éternelles,
Par un soleil d'été, que les Alpes sont belles!
Tout dans leurs frais vallons sert à nous enchanter,
La verdure, les eaux, les bois, les fleurs nouvelles.
Heureux qui sur ces bords peut longtemps s'arrêter!
Heureux qui les revoit, s'il a pu les quitter!"—GUIRAUD.

Of late years bedding plants—that is to say, plants kept under glass during the winter and planted out in the spring—have been the rage. Geraniums and calceolarias, thus treated, yield thousands of blossoms, and, for some situations, geometric beds filled with them are beautiful; nevertheless, thus arranged, except in their proper places, they do not satisfy the mind, and when the inevitable geranium is seen in every garden alike, the charm of novelty is wanting.

Perpetual variety is to be found in the almost countless multitude of species of the beautiful little flowers which adorn the Alps, the Pyrenees, or even the wild banks and heaths of this country, and which may be grown in the alpineries.[1] I have two alpineries, besides a sedum, a saxifrage, and a sempervivum garden; and there is scarcely any time of the year when some lovely object may not be found in them:—indeed at most times of the year such varieties of graceful form are in blossom as completely to satisfy and gratify the mind.

My alpineries are peculiarly constructed. The one at the eastern part of the fern glen is a small mound, in the formation of which, top-spit, fibrous loam is chiefly employed. Large pieces of sandstone are inserted in an irregular manner eight or ten inches into the ground, and stand out as much or more above ground. The earth underneath the stone is adapted for the roots of delicate plants, many of which form masses of roots against the stone, which permanently holds moisture. Some plants will not succeed without this kind of

[1] The word alpinery has been constructed as a companion word to fernery, and, although not etymologically correct, is nevertheless a convenient word for general use.

stone for their roots. The interstices in the blocks of stone above ground afford sheltered places in which the leaves of the plants are protected from cold winds in sharp weather. Where sandstone can be obtained in unlimited quantities, perhaps the best alpinery would be a mere heap of irregularly shaped stones with the crevices partially filled with good soil, so as to leave a rough surface with angles of sandstone projecting like the bristles of a hedgehog. The labourers employed to make a mound, will—unless you stand over them and watch the work being done—always insist on building a structure something like a wall; whereas the blocks of stone should be so arranged as to present outlines as irregular as possible. The proper sandstone may be obtained, but at considerable cost, from Tunbridge Wells, from Balcombe, and from other parts of Sussex; and as those places are at some distance from my garden, I have only been able to indulge in that material to a very limited extent.

I liked my first alpinery so well, and my plants grew so large, that I speedily made a second. This latter is a large mound, and affords room for hundreds of species. It presents an irregular figure from every point of view, rising at some places to two feet above the general level of the ground, and sinking below it at others, till it shelves in one direction to the water of the central stream. The object of this is to obtain series of surfaces exposing a large extent of the mound to view at once; and also to present an arrangement by which, at various parts, the shade or the full blaze of the sun may be commanded, together with every degree of dryness or moisture of the soil, that each plant may require for its growth. The whole of the alpinery has about six inches of brick rubbish forked in, and hundreds of rough flint stones from the chalk quarries are scattered over the surface. Some part of the alpinery is arranged so that narrow fissures are left between the stones, and these are so placed that moisture always exists. Some plants that live in such a position would die in any other. I observed on the Cornichie road, near the coast of the Mediterranean, that the maiden-hair fern always appeared wherever a vein of sandstone existed. Many rare plants are found in rough walls on hill-sides, as in that situation

moisture constantly filters from the earth above. The flint stones are unquestionably inferior in colour to the neutral tint of grey sandstone as they are too white when used fresh from the quarries; nevertheless in the absence of the former material, flints are effective and useful; their presence secures a moist soil underneath, although the stones themselves do not retain the moisture as does the sandstone. Our alpineries are a miniature horticultural world, and success depends upon setting each plant into its right place: for instance, the moisture-loving plant, as the cloudberry, in a moist place; the dry-loving plant, as the house-leek, on the dry crest of the mound. The conditions of my alpineries are so varied that I can accommodate a plant with any degree of moisture in the soil, from comparative dryness to an absolute peat bog under water. I always tell my gardener not to depend too much on his own judgment, but if possible to plant more than one of each species in different situations: no man can hope to attain sufficient experience to determine the conditions under which each plant would best thrive for that would necessarily involve an exact knowledge of the natural history of every plant. My larger alpinery is open to the full air and light of heaven. There no trees are allowed to root; for it is perfectly indispensable, if alpine flowers are wanted, that the plants should be thoroughly exposed to the sun and air.

Although we can, in great measure, regulate the condition of the soil, we can do little to vary the climate. At my garden we suffer from moisture-depositing fogs in winter: it is not then uncommon to see all the leaves of the plants dripping with wet. In this condition they are more prone to die from cold than if covered with dry snow. Hence many alpine plants thrive better in Scotland than they do with me; and it is still a matter for my consideration to find some method by which I may overcome this great difficulty, which our proximity to a warm river in winter entails upon us.

I have a third alpinery, which I call my Saxifrage garden. This has a layer of three or four inches of brick rubbish, which is scattered over with large flints. I have also, at the edge of a bank, a Sempervivum garden; and my Sedums grow on the nearly vertical side of

the Central brook, where their blossoms light up the scene with their brilliant flowers.

In these three alpine gardens hundreds of species are grown. Many, of the most surpassing beauty, are easily passed over and neglected unless sought out with an intelligent eye. It is seldom that I visit the alpineries without finding some new object of interest; and I observe that my visitors linger over these mounds with satisfaction, delight, and admiration.

My alpineries are merely degenerate productions when compared with the glorious example constructed by Messrs. Backhouse of York in whose garden stones of many tons in weight are used, and where the whole design has the appearance of nature. They are, moreover, not to be compared with the beautiful rockeries which can be made where quartz spar can be procured. The Rev. W. Macpherson, of Monnymusk in the valley of the Don, in Scotland, has a pretty rockery made of selected stones. The Rev. Mr. Milne, in the same valley, has also another, formed of quartz spar, which, during a number of years, he has selected from the hills, and transferred to his garden at great labour and cost: these he has arranged as a rockery, on which alpine plants grow in all that luxuriance which a proper soil and a natural climate can alone ensure.

FIG. 649.—Saxifraga oppositifolia.

FIG. 650.—S. granulata.

FIG. 651.—S. granulata (double

The Saxifrages are plants of much interest and great beauty for rock-work. First and foremost, the purple Saxifrage (*Saxifraga oppositifolia*, fig. 649) is very beautiful. There are several varieties, the blossom of one being white, and that of another being rosy pink and

larger. These plants produce large sheets of blossom in early spring, with the snowdrop and the crocus. The *S. granulata* we have in two forms, single (fig. 650) and double (fig. 651). The latter especially is very attractive, and should be grown in every alpinery. The

FIG. 652.—S. intacta minor.

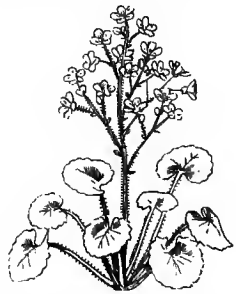


FIG. 653.—S. Geum.

FIG. 654.—S. pectinata.

S. intacta minor (fig. 652) is another species, which grows freely with us. One of the most noble of all the Saxifrages is the grand *S. Cotyledon*, var. *pyramidalis*. The flower spike is of pyramidal form, and, when in flower, about two feet in height: this plant has been pronounced one of the glories of the garden. It did not flower

FIG. 655.—S. bryoides.

FIG. 656.—S. aspera.

FIG. 657.—S. globifera.

with me this year, and so I was unable to figure it from nature; Wooster has, however, figured it. Perhaps the most common of the saxifrages is the London Pride section. The common London Pride is too generally grown to require a figure, but the *S. Geum*, or Kidney-leaved London Pride (fig. 653), should never be omitted from an alpine garden. It grows without any special care.

"Boon Nature scatter'd, free and wild,
Each plant or flower, the mountain's child."

SIR WALTER SCOTT.

We grow the *S. Aizöon* and the *S. pectinata* (fig. 654); the latter forms beautiful silvery rosettes, and may be used not only as a rock but a border plant. We grow also the *S. bryoides* (fig. 655), the *S. aspera* (fig. 656), and the *S. hypnoides*, a mossy plant which forms fine sheets of green foliage. There can be nothing prettier than to see this plant covering over the flint stones; evidently liking for its roots the moisture, and for its leaves the warmth which the stones retain.

FIG. 658.—Saxifraga cæspitosa.

The mossy saxifrages *S. globifera* (fig. 657) and *S. cæspitosa* (fig. 658) grow rapidly after the autumn equinox, when most other plants rest. The colour of the foliage is very beautiful and striking, presenting the most brilliant green when nearly all the other plants are losing their leaves, and when the grass itself has a yellowish faded hue. They grow to such an extent in the winter months that much watchfulness is required to prevent them from covering and destroying all the smaller plants round them; but for covering extensive banks they are invaluable.

The species called *S. Juniperina* is remarkable; the plant has been compared to a number of juniper-trees compressed together. It makes a good, compact, rich plant. The *S. Hirculus* (fig. 658*a*) differs essentially from other saxifrages, in liking a damp place. It grows freely in the boggy parts of our alpineries, and bears a yellow flower.

There are a number of saxifrages of great beauty, forming stiff heads, more like house-leeks. The foliage of many of these is exquisitely beautiful, and the plants are often used for edging beds. We have many varieties of this section, which is a valuable addition to the alpineries.

FIG. 658 *a*.—Saxifraga Hirculus.

The Stone-crops, or Sedums, are fine plants for our alpineries. The common Yellow Stone-crop, when in flower, is a blaze of beauty. The *Sedum anglicum* (fig. 659) has a white flower. We grow many species of

Sedums, but none surpasses *S. Sieboldii* (fig. 660), which flowers in September. When these autumnal sedums are in flower, it is marvellous to see the number of bees which frequent them. Nearly all the sedums are most readily propagated by division, and many of them,

FIG. 659.—Sedum anglicum.

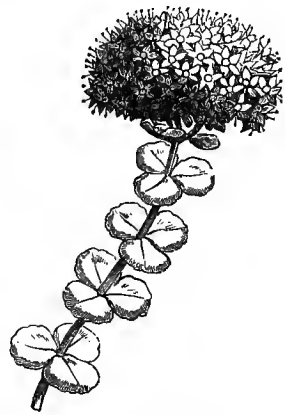


FIG. 660.—Sedum Sieboldii.

FIG. 661.—S. Fabaria, or S. spectabile.

as *S. Fabaria* (fig. 661), freely sow themselves, so care must be taken that the coarser varieties do not propagate themselves to the destruction of the weaker. They grow well in fresh soil, but degenerate when they remain long in one situation. All the cultivation required is to prevent them from overrunning each other, or being overrun by other plants. In a plot of arid ground probably no class of plants can give so much satisfaction for so little trouble. They will cover the top of a wall, and make a position by nature the most uninteresting, assume by art all the loveliness of a flower garden.

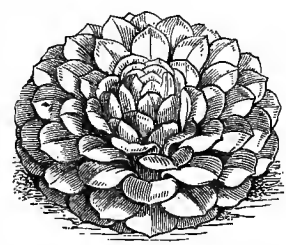


FIG. 661 *a*.—Sempervivum tectorum

The Sempervivums are an interesting tribe, as they live where almost any other plant would perish, even on blocks of sandstone, with scarcely a trace of vegetal mould. Many species live out-of-doors throughout the year, but some require protection in winter. The *Sempervivum tectorum* (fig. 661 *a*) is the only British species. *S. montanum* (fig. 662) is perfectly hardy. *S. californicum* (fig. 663) is both showy and useful for the edging of flower-

beds. *S. arachnoideum* (fig. 664) is particularly interesting from its having a web over its leaves; it grows freely, and stands the coldest winters, although it is reputed to be tender. I found on the St. Gothard Pass a species covered with a web similar to this species, but none of the plants which I brought over lived. I grow also *S. anomalum*, *S. arenarium*, *S. globiferum*, *S. hirtum*, *S. Pittoni*, *S. soboliferum*, *S. Wulfenii*, and many other species.

FIG 662.—Sempervivum montanum.

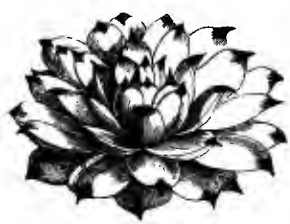


FIG. 663.—S. californicum.

FIG. 664.—S. arachnoideum.

S. spinosum (fig. 665) is a very distinct, rare, and beautiful species. I procured my specimens from Ware of Tottenham, a great cultivator of alpine plants, but I do not yet know whether it is hardy.

Amongst kinds which require protection in winter may be mentioned *S. tabulæforme* (fig. 666), a most remarkable plant, which has a flat, table-like aggregation of leaves. When it flowers, a stem about nine inches long is thrown up, and the flat table is destroyed. Other delicate

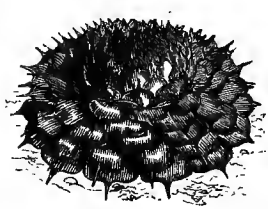


FIG. 665.—S. spinosum.

FIG. 666.—S. tabulæforme.

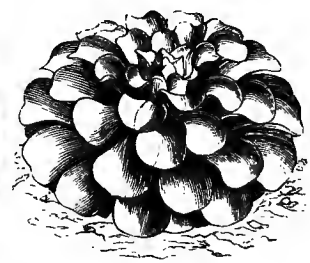


FIG. 667.—S. Bollii.

species are *S. arboreum*, *S. ciliare*, and *S. repens*. *S. Bollii* (fig. 667) is remarkably fine, and is one of the most beautiful of all the species. The whole plant assumes the form of a cup, and every leaf is

curved in the most graceful manner. It is a plant which should be carefully studied by designers and architects.

We grow various species of Echeverias, which are allied to the Sempervivums, and are noble plants for the alpinery. They require protection during the winter, and are planted out in spring. The *Echeveria metallica* (fig. 474) is a grand plant. The *E. secunda* (fig. 668) is finely coloured. We grow also *E. navicularis*, *E. grandiflora*, and *E. sanguinea*. None of these species will bear frost.

FIG. 668.—Echeveria secunda.

FIG. 669.—Pachyphytum bracteosum.

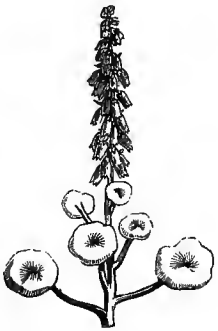


FIG. 670.—Cotyledon umbilicus.

Another succulent plant, *Pachyphytum bracteosum* (fig. 669), produces a fine effect when planted out in the summer months. From its colour and general appearance it contrasts well with the neighbouring plants, and stands out in bold relief.

Not widely removed from the sempervivums there is another plant, the *Cotyledon umbilicus* (fig. 670), which grows throughout Europe, and which has acclimatized itself on our root-works and walls. It comes up annually, and therefore gives us no trouble in its cultivation.

FIG. 671.—Scilla sibirica

Many bulbous plants grow in our alpineries, where they are undisturbed from year to year.

The Scillas are charming blue spring-flowers, blossoming very early. The *Scilla sibirica* (fig. 671) is of a porcelain blue, and quite hardy. This is so splendid a flower that a large number of plants should be procured, which is not difficult, as the

bulbs are sold by the hundred, and, when once planted, come up annually without further trouble. The *Scilla bifolia* (fig. 672) is another interesting plant, which should also be grown. There are large scillas very much like the common bluebell, which are not desirable for the alpineries, though they may be grown in the ferneries. The bluebells (*Scilla nutans*) are grown by thousands amongst our ferns, and a mass of this wild flower alternating with yellow primroses adds much to the charm of the wild garden.

"Where knots of bluebells droop their graceful heads."—KIRKE WHITE.

We plant in our alpineries a few of the common Crocus for effect, as it is difficult to obtain many specimens of the wild species, of which, however, we have six or eight. We grow, too, the *Bulbocodium vernum* (fig. 673), which flowers without leaves in March and April; also the *Colchicum autumnale* (fig. 674), which flowers in October; likewise the

FIG. 672.—Scilla bifolia.

FIG. 673.—Bulbocodium vernum.

FIG. 674.—Colchicum autumnale.

double variety, which is very showy when flowers are scarce. Amongst the different species of crocuses I have the *Crocus luteus*, brought from Switzerland; also the Saffron Crocus (*C. sativus*), and the common *C. reticulatus*, which is the earliest of all crocuses.

The *Galanthus plicatus*, or Great Crimean Snowdrop, grows in the alpinery. This latter has much larger leaves, but not much larger flowers, than the common snowdrop.

The Anemones are very charming additions to our alpineries, and several species are grown. One common species, called the *Anemone nemorosa* (fig. 675), is to be found in all our woods. It has a white flower, and we grow it in some quantity in our ferneries;

it is an important plant, as it flowers and dies down before the fronds of the ferns sprout forth. The double variety (fig. 676) is also beautiful, but I think the single has the greater charm. The flower has a faint odour, which some persons cannot detect. The anemones of Italy (fig. 677), which literally carpet the ground near Rome, are grand flowers. Well do I remember the delight with which I first saw

FIG. 675.—Anemone nemorosa.

FIG. 676.—A. nemorosa (double).

FIG. 677.—Purple Anemone of Italy.

them in the island of Capri; and afterwards, at Rome, the eagerness with which I possessed myself of roots, when the ground was literally covered with them, at the celebrated Villa Doria. The *Anemone apennina* (fig. 678) gives vivid sky-blue flowers. The *A. Pulsatilla*, or Pasque flower (fig. 679), is a true native of Britain, and is said to grow on chalk downs. The *A. palmata* (fig. 680) is another beautiful species.

FIG. 678.—A. apennina.

FIG. 679.—A. Pulsatilla.

FIG. 680.—A. palmata.

Amongst the bulbous plants, the *Camassia esculenta* (fig. 681), a plant that grows on the west coast of North America, is particularly interesting, as it constitutes the chief vegetal food of the Indians. The flower itself is very simple, but nevertheless very attractive to me, and I prize my plant far beyond its intrinsic worth.

Specimens of some of the different varieties of Alliums, such as *Allium nutans* (fig. 682), ought to have a place in every fernery.

The *Oxalidæ* are numerous in species and beautiful in flower. The *O. Acetosella*, or Shamrock, grows with me freely in shaded damp places. The *O. rosea* (fig. 683) has a great abundance of fine flowers; these open in the morning, and close in the afternoon. The frost destroys the bulbs.

"Oh the Shamrock, the green immortal Shamrock,
Chosen leaf Of bard and chief,
Old Erin's native Shamrock!"—MOORE'S *Irish Melodies*.

FIG. 681.—Camassia esculenta.

FIG. 682.—Allium nutans.

FIG. 683.—Oxalis rosea.

The common fields in Italy are covered at Easter time with yellow and red tulips growing wild. I brought from Florence many bulbs. The flowers are really fine (fig. 684), and are used to decorate the Italian churches at Easter,—or rather, they are used in them on Holy Thursday, for the gardens of the Holy Sepulchre.

FIG. 684.—Tulip from Italy.

The *Amaryllis*, or *Sternbergia lutea* (fig. 685), or Lily of the Field of the Bible, grows freely in the driest places of our alpineries, and may be propagated by division. In Palestine in autumn, it is said to come up in large patches; and the glossy leaves with bright yellow flowers, growing in masses in the midst of an arid, desolate wilderness, must produce a great effect on the mind.

FIG. 685.—Lily of the Field.

There are many small species of Iris, well adapted for the alpinery, such as *Iris attica*, from Greece, and *Iris rhœtica*: both of these sorts are very dwarf, and are well adapted to mix with our alpine plants; as also is the *Iris nudicaulis* (fig. 686), which has beautiful blue flowers.

We intersperse over the alpineries our common English orchids, such as the Spotted, the Bee, the Butterfly, the Fly, and the Man orchids, and in the damp parts the Marsh orchid, which have been before described; we also plant a few feathered and grape hyacinths, to give variety to our collection of flowers. On the Continent, the *Tritcleia uniflora*

FIG. 686.—Iris nudicaulis.

FIG. 687.—Triteleia uniflora.

FIG. 688.—Erica herbacea.

(fig. 687) is often used for decorative purposes, but not so frequently in this country. It grows freely with me, and is a very valuable spring flower; it has, however, a disagreeable odour.

After the bulbous plants, we have arranged a few hard-wooded ones, among which none can exceed in beauty the common Heather. It is hard to transplant, but will grow perfectly well from seed. It likes peat soil and a damp situation. Some of the Heaths, especially the winter-flowering heaths, are invaluable for their remaining in bloom a long time, and from their being highly ornamental. The *Erica herbacea* (fig. 688) is especially desirable.

FIG. 689.—Menziesia polifolia.

The *Menziesia polifolia* (fig. 689), with its bell flowers, is a worthy occupant of the alpinery. It requires peat earth, and plenty of light and air.

The Creeping Willow (*Salix herbacea*) should have a nook, but it has never done well with me, from some cause which I never could discover.

The Alpine Rose, or Rhododendron (*R. ferrugineum*, fig. 690), is a plant of much interest to all who have visited alpine scenery. It does not appear to grow well with me. Wherever it is planted peat soil should be used.

Out of respect for the immortal naturalist Linnæus, no less than from the intrinsic beauty of the plant, every alpine plant cultivator should remember the *Linnæa borealis* (fig. 691). It does not grow readily, but

FIG. 690.—Alpine Rose.

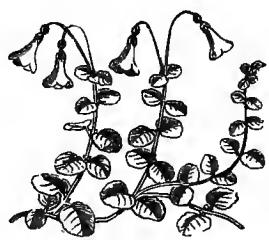


FIG. 691.—Linnæa borealis.

FIG. 692.—Omphalodes verna.

if planted in damp soil, in a shady place, it will thrive, and produce its exquisite little flowers. The great naturalist was so fond of this little plant that he adopted it for his coat of arms. I found it growing in great luxuriance in some woods in the valley of the Don, and brought home a fine specimen, which I trust will flourish in my alpinery. Amongst showy flowering plants, the exquisite blue *Omphalodes verna* (fig. 692) is striking, as it puts forth its flowers in spring, and, though not uncommon, a garden may advantageously have several plants.

Somewhat resembling this latter plant, we have the Forget-me-nots, which last from earliest spring till late in autumn. The Wood Forget-me-not (*Myosotis sylvatica*) is apt to seed too freely in the alpinery, and therefore may be confined to the other parts of the garden, and the *M. dissitiflora* (fig. 693) used in its stead: this really has a much finer flower, but is apt to be neglected, as it opens with a reddish tint, and does not show its full beauty till the flower is completely expanded.

The *M. rupicola* (fig. 694) is more dwarfish, and is covered with large heads of the most brilliant flowers. At the lower part of the alpinery, at the edge of the brook, our English Forget-me-not (*M. palustris*) gives its flowers during the summer and autumn. I have it growing in the water, but it does not flower so freely there as when it is planted in the earth near the water, in which situation it attains its highest perfection. Although a common wild plant, its beauty commands extensive growth.

FIG. 693.—Myosotis dissitiflora.

FIG. 694.—M. rupicola.

FIG. 695.—Veronica maritima.

We grow many Speedwells (*Veronica*). The lovely *V. Chamædrys* grows wild with us. The *V. maritima* (fig. 695) is an elegant plant, and lasts in blossom a long time. *V repens* (fig. 696) is well adapted for the rock-work. We grow also *V. aphylla, V. amœna, V. candida, V. nummularia, V. saxatilis, V. spicata, V. Teucrium, V. rupestre, V. virginica,* and other species.

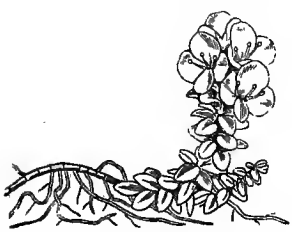


FIG. 696.—Veronica repens.

FIG. 697.—Trillium grandiflorum.

FIG. 698.—Maianthemum bifolium.

The *Trillium grandiflorum* (fig. 697) is a fine plant. It requires some shade and a somewhat damp place, as it naturally grows in woods in Canada. I hope to grow this plant in large quantities. *Maianthemum bifolium* (fig. 698), an ally of the Lily of the Valley, may

be grown in a similar situation: to show its white flowers to advantage it should be grown in a good-sized patch.

The Butterwort (*Pinguicula vulgaris*, fig. 699) is another plant liking a damp situation. I always find it difficult to grow, and have continually to procure new plants, of which there are plenty on the moors of Yorkshire and at other places. The Irish species is larger than the English.

FIG. 699.—Pinguicula vulgaris.

FIG. 700.—Parnassia palustris.

Also loving a damp spot, but full exposure to light, the glorious Grass of Parnassus (*Parnassia palustris*, fig. 700) grows. This is a flower which should be cultivated in quantity, and I have obtained basketfuls from Whitby to grace my garden. It both flowers and seeds freely, but it does not propagate well, and I am perpetually obliged to have recourse to new importations.

The *Silene acaulis* (fig. 701) is highly spoken of by that able botanist Mr. Backhouse, who describes it as adorning the crags of the Highland and Welsh mountains, and as yielding solid carpets of pink, rose, or

FIG. 701.—Silene acaulis.

FIG. 702.—S. alpestris.

FIG. 703.—Mazus pumilio.

crimson flowers. I have never seen it in that situation, but we have it on a moderate scale. The *S. alpestris* (fig. 702) is another desirable alpine plant. The *Mazus pumilio* (fig. 703) is a great favourite of mine, and it produces beautiful blue flowers in great quantities.

The Epimediums are remarkable plants when in blossom in spring; a severe frost, however, at that time will destroy the flowers, and this occurred in 1871. We grow three species of equal merit, but *Epimedium rubrum* (fig. 704) shows their character as well as any.

The *Helianthemum vulgare* (fig. 705) does much to embellish an alpinery. We grow several species, of which the one figured is a good example. There are many florists' varieties of the plant.

FIG. 704.—Epimedium rubrum.

FIG. 705.—Helianthemum vulgare.

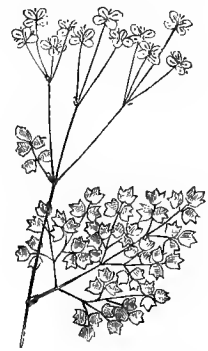


FIG. 706.—Thalictrum minus.

The foliage of the Thalictrums is useful for the alpinery. When I first saw one species at Zermatt, I mistook it for Maiden-hair, as the leaf is similar to that of an adiantum. We cultivate two or three species, but the *T. minus* (fig. 706) is the best. The flower is not attractive.

Amongst plants to be grown merely for their foliage, the *Alyssum alpestre* (fig. 707) is curious from its stellate hairs. A variegated species of Arabis is very showy, but it is apt to extend itself over its neighbours, so that unless restrained it is dangerous to the surrounding plants.

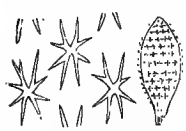


FIG. 707.—Alyssum alpestre (leaf nat. size, and stellate hairs enlarged).

Amongst the more showy plants, the Yellow Poppy (*Papaver nudicaule*, fig. 708) is conspicuous. The colour is very striking, and I know scarcely anything more astonishing than to see the brilliant but delicate blossoms expand under the fiercest blaze of the sun without showing the slightest injury.

FIG. 708.—Yellow Poppy.

The flowers of the varieties of Dianthus are highly ornamental, and grow like weeds with me, scattering their seeds in all directions. We have several species—all beautiful—producing a multitude of flowers.

FIG. 709.—Dianthus chinensis.

FIG. 710.—D. fragrans.

FIG. 710 *a*.—Dianthus cæsius.

D. chinensis (fig. 709) is a charming plant: *D. fragrans* (fig. 710) is also very beautiful. *D. cæsius*, or the Cheddar Pink (fig. 710*a*), is interesting.

The *Statice latifolia* (fig. 711) is a very desirable plant for the alpinery; it is a native of Siberia, and flowers late in summer and in autumn. It has branching panicles, with innumerable small lavender blossoms, and is a fine, handsome, hardy perennial.

FIG. 711.—Statice latifolia.

FIG. 712.—Alpine Snapdragon.

FIG. 713.—Linaria tristis.

Allied to the Statice, the Thrifts are useful, and particularly the Alpine Thrift (*Armeria vulgaris*), which is used for edging, but I have not so employed it in my garden.

The Alpine Snapdragon (*Linaria alpina*, fig. 712) is a very valuable rich plant, as it is in flower the greater part of the year, and seeds as freely as any weed. There are also other snapdragons; and amongst our own garden plants, the antirrhinums form a most important feature, and have been already noticed. The *Linaria tristis* (fig. 713) is a desirable acquisition.

The *Acæna Novæ Zelandicæ* (fig. 714) is a very curious plant, which grows freely with me. It sends up crimson spikes of flowers, growing in sheets not above an inch in height.

There is a very small plant, called the *Arenaria balearica* (fig. 715) which creeps over the stones, sending forth multitudes of small white flowers.

The *Pentstemon glabrum* (fig. 716) has large blue flowers, and is brought from the Rocky Mountains.

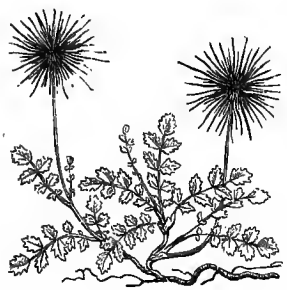


FIG. 714.—A. Novæ Zelandicæ.

FIG. 715.—Arenaria balearica.

FIG. 716.—Pentstemon glabrum.

The *Aphyllanthes Monspeliensis* (fig. 717) is unlike any other plant, for it has a succession of single blue flowers at the top of a rush-like stalk. It is not often grown, but its singular habit cannot fail to attract attention, and the general effect produced by the plant is very pleasing.

The *Geum coccineum* affords beautiful bright scarlet flowers.

The *Alyssum saxatile* is rather a coarse plant, but yet it has fine spikes of yellow flowers.

FIG. 717.—Aphyllanthes Monspeliensis.

It is difficult to decide which is the most beautiful of so large a number of lovely plants; nevertheless there are many that demand particular attention. The Phloxes are showy and desirable plants. The *Phlox divaricata* (fig. 718) is a most excellent, low-growing plant for rock-work. *Phlox Nelsonii* (fig. 719) has clear white flowers, and is very effective and lovely. Both of these plants are easily propagated by cuttings.

The Alpine Wallflower (*Cheiranthus alpinus*, fig. 720) must never be omitted from an alpinery, as its fine heads of yellow flowers make a

FIG. 718.—Phlox divaricata.

FIG. 719.—Phlox Nelsonii.

FIG. 720.—Cheiranthus alpinus.

grand display in spring. It is always advisable to have many of these plants, which are easily obtained by cuttings, and this is a species which may be advantageously introduced into the general flower-garden.

The *Lithospermum fruticosum* is perhaps somewhat unduly extolled. It derives its generic name from the flinty hardness of the stones of the fruit. Its dark blue flowers are its chief attraction. On the chalk hills near us a species of lithospermum grows wild, but we have not been able to flower it in cultivation.

Amongst the alpine plants, the glorious Gentianas are some of the special desiderata; but all the species are difficult, and some it is almost impossible to cultivate. The *Gentiana acaulis* (fig. 721) is the garden Gentianella. It does well in some places, but not in others, preferring a solid ground of sandy or gravelly loam, and requiring abundance of light and air. It has never succeeded so well with me as I have seen it in other places; nevertheless it is a lovely plant. Incomparably superior to the last-mentioned species is the *G. verna* (fig. 722). I have seen this in perfection at Zermatt. I have seen it in large quantities on the St. Gothard Pass, and the few flowers I obtain are but as the "dim shadow of glory" when compared with

FIG. 721.—Gentiana acaulis.

FIG. 722.—G. verna.

the blossoms which cover the plants in their natural habitats. They should be planted against pieces of sandstone, as the delicate roots penetrate deeply, and like continual moisture. The plant must not be shaded or overcrowded by any other plant. With all our care we cannot produce perfectly well-grown plants, but can only hope to exhibit a specimen of the flower. The two former species have single blue flowers, but there are other species with spikes of flowers, such as the *G. gelida* (fig. 723), which we grow with little trouble. I have seen others of the smaller kinds on the Alps, which are excessively difficult to grow artificially, but the whole class of Gentianas is so exquisitely beautiful that the horticulturist should endeavour to cultivate any that he may be able to obtain. Some of the larger kinds, as *G. gelida*, are not difficult to cultivate; and one, *G. Pneumonanthe*, grows wild on some of the commons of Surrey.

FIG. 723.—G. gelida.

Many species of Campanulas are grown in my alpineries, and yet I do not know that there is one which I more appreciate than the blue Hare-bell, which grows wild on the neighbouring commons, and has even insinuated itself as a wild plant into my garden. (See Wild Flowers.) Some species are tall growers, others creep upon the earth, and again some are of an intermediate size; but all are lovely *C. pyramidalis* is a fine species with blue flower, which was formerly much used to decorate the interior of buildings, and by management can be grown above four feet in height. There is also a white variety of it. *C. persicifolia* (fig. 724), a fine species with large blue flowers, of which there are several florists' varieties,—one of which, var. *coronata alba* (fig. 725), is particularly beautiful,—is a great ornament to the alpinery. *C. rotun-*

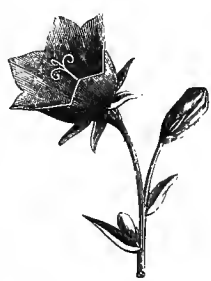


FIG. 724.—Campanula persicifolia.

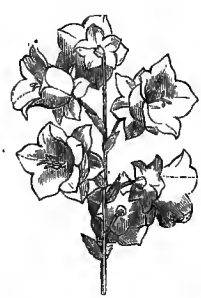


FIG. 725.—Campanula coronata alba.

difolia, which grows about a foot high and has a blue flower, is also a fine species. There is a white variety of it (fig. 726), which is a desirable plant. *C. hirsuta* (fig. 727) is a creeping plant with hairy leaves. *C. garganica* is a really valuable plant for the rockeries; and there are many other species which it is desirable to grow in the alpineries, but which I do not consider it requisite to describe. *C. speculum* is also called Venus's Looking-glass.

FIG. 726.—C. rotundifolia.

FIG. 727.—C. hirsuta.

FIG. 728.—Abyssinian Primrose.

The Primulas are an extensive genus of plants, of which we grow several species. I have tried *Primula denticulata*, but it has not lived out of doors. I have also tried the Abyssinian Primrose (fig. 728), but with what success I cannot as yet tell. The beautiful *P. amœna cortusoides* (fig. 729) likewise does not thrive well with me.

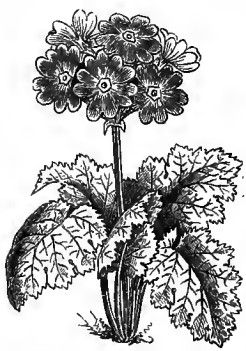


FIG. 729.—Primula cortusoides.

FIG. 730.—P. villosa.

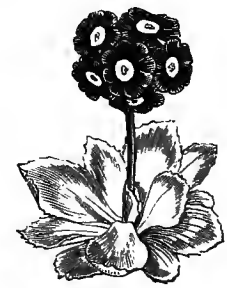


FIG. 731.—P. auricula.

Another species (fig. 730), the name of which has been determined to be the *Primula villosa*, does well. I found it in quantity in the month of May on the Italian side of the St. Gothard Pass, lighting

up the granite rocks with great effect, as the foliage and flowers were of singular grace. I brought over many plants, which appear to do best on the alpinery a little below the ground line.

The *P. auricula*, from Switzerland (fig. 731), grows with us.

The florists' varieties grow much better in Scotland than they do in my garden. We have some varieties, but never attempt to grow them in the perfection attained by those who make these plants their special study.

The *Soldanella alpina* (fig. 731*a*) is a little gem in its way. It grows naturally well protected by large stones, and is a lovely spring flower.

We grow a few plants of the *Gnaphalium arenarium* (fig. 732), the French everlasting flower, of which the immortelles are made. It is easily propagated by cuttings, but the plant has not thrived very well with me, and has not given much blossom. Our moist atmosphere in winter does not suit it.

FIG. 731*a*.—Soldanella alpina.

FIG. 732.—French Everlasting.

FIG. 733.—Geum montanum.

The Lion's-paw Cudweed (*Gnaphalium leontopodium*, fig. 742*a*) is a perennial species which grows at a considerable altitude on the Alps. It is completely covered with white silky cotton. It is said that in some parts of the Continent young ladies, on their betrothal, always expect to receive, as one of their earliest presents, flowers of this plant, as a proof of the activity of the gentleman, who must ascend to a considerable height in order to procure it. The *G. dioicum* is another interesting dwarf alpine species, having red flowers.

Amongst the general flowering plants which like air and light, the Geums (as the *G. montanum*, fig. 733) are showy.

That troublesome weed, the *P. Anserina*, has lovely flowers, but is difficult to exterminate, and must on no account be admitted to the alpinery. We have other varieties that are interesting. (See p. 343.)

All these flowering plants are better grown in an intermediate position, than at the top or at the bottom of the alpine mound, as thus the roots are neither too dry nor too wet.

The *Draba beotica* (fig. 734) has somewhat the appearance of a saxifrage, but its group of flowers is very dissimilar.

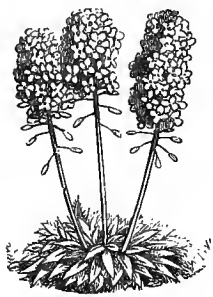


FIG. 734.—Draba beotica.

FIG. 735.—Aubrietia Campbelli.

FIG. 736.—Dodecatheon Meadia.

The *Aubrietia Campbelli* (fig. 735) is of a brighter hue than other flowers of its genus. Its colour is violet blue, and it blossoms in great profusion in March.

The American Cowslip (*Dodecatheon Meadia*, fig. 736) should not be omitted from our flowering alpine plants. Its erect stem, crowned with flowers, is dissimilar from other plants. It is perennial, and only requires to remain undisturbed. There are varieties of this flower.

FIG. 737.—Erigeron speciosus.

Then we have *Erigeron Roylei*, or *speciosus* (fig. 737), which is a handsome species from the Himalayas; it has a yellow, disc-like flower, with purple rays.

FIG. 738.—Genista sagittalis.

The *Genista sagittalis* (fig. 738) produces abundance of yellow flowers in summer, and is consequently valuable.

The *Polygala Chamæbuxus* (fig. 739) is an evergreen species, having yellow flowers, and is a very beautiful little shrub: it grows very freely with me, and may be propagated by division.

FIG. 739.—Polygala Chamæbuxus.

FIG. 740.—Linum flavum.

FIG. 741.—Solidago cambrica.

The Yellow Flax (*Linum flavum*, fig. 740), with bright yellow flowers, is a lovely plant from Austria, which can easily be grown in protected places. The Welsh Golden Rod (*Solidago cambrica*, fig. 741) is the species of its genus best adapted for the alpineries, and has bright yellow flowers. The *Trollius europæus* (fig. 742) has a very beautiful

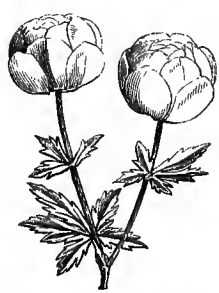


FIG. 742.—Trollius europæus.

FIG. 742 *a*.—Gnaphalium leontopodium.

FIG. 743.—Vicia Cracca.

yellow, golden flower. When we desire a trailing plant, the *Vicia Cracca* (fig. 743) grows freely, which from difference of character intensifies the interest of the whole group.

On the slopes of the alpinery towards the brook grow the Cranberry, the Stoneberry (*Rubus saxatilis*, fig. 744), the Berberry, the Cloudberry, and many other bog plants. Near the water we grow the *Drosera rotundifolia* (fig. 745), and the other English species, which I have imported by hundreds, but which never came up the second year. The *D. rotundi-*

FIG. 744.—Rubus saxatilis.

folia is found on Hampstead Heath, and I have seen it on Weybridge Common; but the way to get it with least trouble is to watch Covent Garden Market, as some rustic is sure, during the season, to bring for sale bundles of these plants. It is one of the curious fly-catching species; the hairy leaf is covered with some adhesive substance, on which any insect which may venture to settle is entrapped. No doubt this fly-catching apparatus performs a part in the economy of the plant, but the philosophical explanation is yet wanting; I respect these singular plants, I admire them, but I wonder at them.

FIG. 745.—Drosera rotundifolia.

Towards the edge of the water, the Bog Bean (*Menyanthes trifoliata*, fig. 746) is planted, which, although it does not grow wild in my garden, is found in one of the fields in my occupation in the neighbourhood.

FIG. 746.—Bog Bean.

FIG. 747.—Calla palustris.

FIG. 748.—Hippuris vulgaris.

In the same artificial swamp we have the *Calla palustris* (fig. 747) and the *Hippuris vulgaris* (fig. 748). The former plant is rather tender; but the latter is very interesting and grows very fast, but is troublesome on account of its spreading properties.

The above list gives but a faint idea of all the flowers I cultivate in my alpineries, but I am always losing some plants and adding others. If I take a journey, it is seldom that I do not add one plant.

If I walk the streets of London, there are very few days on which I do not see some enticing little plant in the shops to add to my collection. If I pay a visit to my friends, it is rare that there is not something which they kindly spare. Nevertheless, heat or cold, wet or drought, insects or moles, are constantly destroying some of the plants which I already possess, and if left alone the strong would overpower the weak, the tall would overshadow the dwarf, and the more showy would be protected at the expense of the modest and unobtrusive: thus alpineries continually require watching, regulating, and replenishing. An alpinery is a source of great enjoyment, and may be cultivated upon the smallest or upon the largest scale. An alpinery a foot square would hold several interesting and beautiful plants, and an alpinery an acre in extent would scarcely suffice to satisfy the demands of the earnest horticulturist, so between the two the amateur must take his choice. Nothing in horticulture has ever given me so much satisfaction for so little trouble as my alpinery, which produces

"Flowers of all heavens, and lovelier than their names."

TENNYSON.

ORNAMENTAL GRASSES.

Some of the grasses are so lovely that they cannot be altogether omitted from the flower-border. The *Briza media* grows wild in my field as a perennial grass. The *B. maxima* (fig. 749), an annual grass, is valuable for nosegays. The Pampas Grass is exceedingly noble. It forms large tufts from two to three feet across, and in the autumn sends up flower-spikes six to eight feet high. A fine plant in good condition will send up a large number of spikes from five to eight feet high, but it has the great disadvantage of not withstanding severe frost (see plate 20). Some of my plants which have attained the highest perfection have been so much injured by frost as to become unsightly,

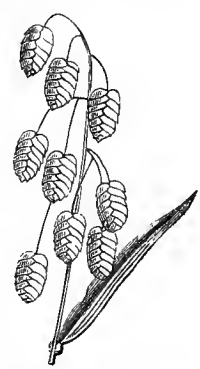


FIG. 749.—Briza maxima.

One or two plants should always be grown, and replaced if destroyed by cold.

We have the Sweet-scented Vernal Grass (*Anthoxanthum odoratum*, fig. 750). It has the peculiar odour which characterizes new hay. Like all other scents, we find it reproduced in many plants of very

FIG. 750.—Anthoxanthum odoratum.

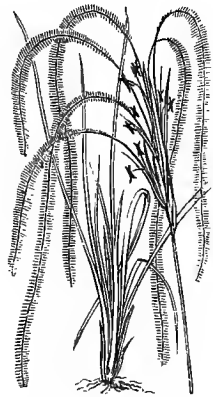


FIG. 751.—Stipa pinnata.

FIG. 752.—Lagurus ovatus.

different classes; and the same odour is noticed in the Woodruff (*Asperula odorata*), and in the Tonka Bean (*Dipterix odorata*).

I have neglected for years the *Stipa pinnata* (fig. 751). It is a very rare English grass of surpassing beauty, and I shall certainly plant it again this spring.

FIG. 753.—Water Grass.

FIG. 754.—Common Reed.

The *Lagurus ovatus* (fig. 752) is another pretty grass, that is found occasionally in England, and it should always be grown in the garden. There are many other species of ornamental grasses which may be grown here and there, when there is sufficient space; and at various times I have had many species. One particularly must be noticed, the Water Grass (fig. 753), which is a striking ornament at the Backwater, at the edge of the stream.

The common Reed (*Phragmites communis*, fig. 754) grows to a

height of ten feet, and is surmounted by an ornamental flower. Its underground stems extend themselves beneath the surface of the soil, and I have known them to pass under a gravel walk and come up on the other side. It is highly ornamental when planted in a suitable place (see plate 13). In the lower part of the Thames there are acres of this reed, and hurdles are made of it in Essex.

The Southern species (*Arundo donax*) is more noble. It grows freely on the coasts of the Mediterranean, in France and Italy, and there attains such magnitude and strength that it is used for stakes upon which to train vines. Although it there makes such stupendous growth every year, in this country it does not grow beyond six or seven feet in a season.

There is a fine species of grass in Ceylon, the Lemon Grass (*Andropogon schœnanthus*); it requires here a stove temperature in winter or a greenhouse in summer. When its leaves are bruised, it exhales the lemon perfume. It grows with me in the orchard-house in the summer and in the fernery in the winter. This Lemon Grass yields an essential oil, which is sold in large quantities for the verbena scent. It is sometimes employed to flavour sugar, and I am informed that an ounce of the oil of this grass will flavour at least a ton of sugar.

We grow in the fernery an exquisite form of a variegated grass (*Panicum variegatum*, fig. 755). It does not like shade in winter, and, indeed, without abundance of light it speedily dies. It is, however, very rich in colour, and exceedingly beautiful.

FIG. 755.—Variegated Grass.

FIG. 756.—Couch Grass.

The Couch Grass (fig. 756), which I shall mention again under the head of Weeds, is the abomination of gardeners: we have it in small quantities.

The Cock's-foot Grass (*Dactylis glomerata*, fig. 757) grows on the

banks of our river. When in flower, the quantity of pollen which is produced is prodigious. From five years of age till within the last few years I suffered annually from hay fever, and could hardly venture beyond the precincts of London when this grass was in flower, which was generally between the 10th and 20th of June. The malady, however, suddenly left me, and I can now look with impunity at the pollen which falls from the flower. Whilst the disease lasted, nothing benefited me but opium, tobacco, and darkness. There is a variety of this grass with coloured leaves which has been sometimes used for edging.

FIG. 757.—Cock's-foot Grass.

FIG. 758.—Carex pendula.

The *Carex pendula* (fig. 758) is a wild plant, growing near London. I remember, when a student, finding it at Hampstead. It grows freely at Hornsey. It is a magnificent plant, and is very showy. The effect of the common sedge by the side of our lake is fine, and is well shown in plate 16, where the sedge between the eel-trap and the Overfall adds greatly to the general effect.

WEEDS AND WILD PLANTS.

"By the love
Of their wild blossoms our young footsteps first
Into her deep recesses are beguiled."—MRS. HEMANS.

Byron, speaking of the wild plants of Italy, says, "All thy weeds are flowers;" which may truly be said of those of my garden, for many beautiful flowers come up spontaneously as weeds, without our care, without our thought, and without our cultivation. The first

beautiful weed, which appears abundantly in spring, is the *Ranunculus ficaria* (fig. 759). It has brilliant yellow blossoms and a shining leaf. There is scarcely even a cultivated flower which is finer. After this the Marsh Marigold (*Caltha palustris*, fig. 760) comes up, and we preserve it. The flower is most noble, and at a particular period of the year

FIG. 759.—Ranunculus ficaria.

FIG. 760.— Caltha palustris.

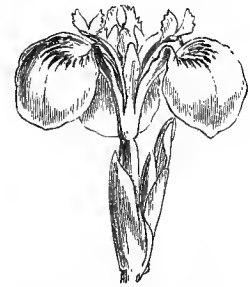


FIG. 761.—Yellow Water Iris.

it is the special glory of the garden. There is a double variety of it very beautiful, but not so beautiful as the natural blossom. Although a wild plant, it should always be grown.

By the side of our lake the Yellow Water Iris (*Iris pseud-acorus*, fig. 761) grows in great perfection. It was not at first an inhabitant of my garden, though it grew abundantly in the next field, but we have it now in large quantities. A flower-spike when gathered has the rare merit of preserving its blossom for a considerable period.

The Bulrush (fig. 762) also is a plant imported from the next field. Together with the Iris, it forms a capital shelter for moor-fowl, which now abound in the lake.

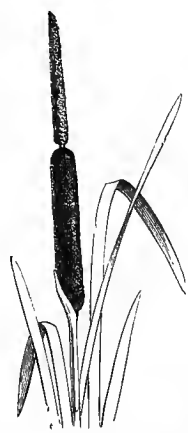


FIG. 762.—Bulrush.

FIG. 763.—Purple Loosestrife.

Another wild flower, the Purple Loosestrife (*Lythrum Salicaria*, fig. 763), contributes much to the beauty of all river-sides in midsummer. It comes up naturally all over my grounds, and is perennial. It forms heads of a purplish red, which are magnificent. We also

cultivate a variety of this plant called *L. roseum;* I observe, however, that in a wild state each plant differs in the intensity and brilliancy of its colour. River scenery would be shorn of half its interest if deprived of this important wild plant. In particular, it contributes its share to the wonderful colouring of the banks of the Thames in summer.

Later in the season, the Figwort (*Scrophularia nodosa*, fig. 764) flowers along the banks of the Wandle. It is a singular and interesting wild plant.

FIG. 764.—Figwort.

We have imported from the valley of the Thames the beautiful Flowering Rush (*Butomus umbellatus*, fig. 765), which grows sparingly all along the banks of the Thames, and also along those of the Lea. It has not yet flowered with me.

It is noteworthy that the charming White Water Lily does not grow in my garden, and cannot be made to do so. Whether it is the quality of the water, or its low temperature in summer, I cannot tell. We have tried the plant several times without success, and one of my neighbours did the same during a series of years, but utterly failed to acclimatize it. Neither have we the Yellow Water Lily in our streams.

FIG. 765.—Flowering Rush.

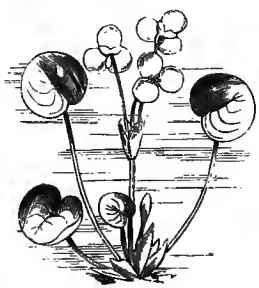


FIG. 766.—Frog-bit.

FIG. 767.—Speedwell.

The Frog-bit (*Hydrocharis morsus-ranæ*, fig. 766) is a charming plant It was imported from the neighbouring common, and it grows and flowers in a tiny pond.

In early spring a most lovely weed takes the liberty of coming up

spontaneously in our alpineries and borders, the Speedwell (*Veronica chamædrys*, fig. 767). Its flower soon drops when gathered, but it blossoms to gladden our eyes when the nightingales delight our ears, and when this flower appears we know that summer is at hand. It is indeed a beauty amongst all the beauties of the garden. In the water, the allied *Veronica Beccabunga* prospers.

Growing side by side with this lovely plant, the Ground Ivy flourishes in great perfection. It is highly ornamental in its proper position.

Immediately after this lowly creeping plant, the Ox-eye (*Chrysanthemum leucanthemum*) throws up its brilliant white flowers, and looks as if it had a right to assert itself and be quite satisfied with its own appearance. In Scotland, the beautiful *C. segetum* (fig. 768) is as common as the *C. leucanthemum* is near London. I brought some plants this autumn from that country, but whether they will do in our climate time alone will show.

FIG. 768.—Chrysanthemum segetum.

FIG. 769.—Lysimachia nummularia.

FIG. 770.—Spiræa ulmaria.

During the summer the Moneywort (*Lysimachia nummularia*, fig. 769) puts forth blossoms along its creeping stems, making these look as if they were covered with guineas. It is a universal favourite, and may continually be seen hanging down from the window-sills in London, where I always admire it. I have a variety of it, the leaves of which are of a golden colour; when, however, the flowers come out, there is no contrast between leaf and blossom, and it is in fact, like many other florists' flowers, an instance of nature deteriorated by art.

The odoriferous Meadow-sweet (*Spiræa ulmaria*, fig. 770) comes up wild over our garden and field, as though determined not to "waste its sweetness in the desert air." I carefully cultivate this plant, and, when mixed with the allied pink species from Japan, it can hardly be surpassed by the flowers of the garden.

FIG. 771.—Malva sylvestris.

FIG. 772.—Datura Stramonium.

FIG. 773.—Myosotis palustris

Fine specimens of the Mallow plant (*Malva sylvestris*, fig. 771) grow in our field. It is really a grand plant, but too large to introduce into the garden, except in the most uncultivated parts.

The *Achillea millefolium* springs up on our lawn, but the mowing machine effectually prevents it from flowering. I do not object to

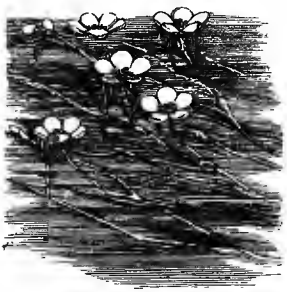


FIG. 774.—Water Ranunculus.

FIG. 774*a*.—Sium angustifolium.

FIG. 774*b*.—Poisonous roots of Water Parsnip (Œnanthe crocata).

its presence, but on the contrary rather approve of it. The grand *Datura Stramonium* (fig. 772) grows occasionally.

By the side of our brooks the true Forget-me-not (*Myosotis palustris*, fig. 773), one of the most beautiful of all flowers, blossoms abundantly;

and in the water itself the Water Ranunculus (fig. 774), with its dark green divided leaves, shows that Nature has a plant for every position.

In our water-cress beds the *Sium angustifolium* (fig. 774*a*) constantly grows, but I have not permitted the dangerous, deadly *Œnanthe crocata*, or Water Parsnip (fig. 774*b*), to grow in my streams.

Buttercups and Daisies put to shame many a florists' distortion; and in shady spots the *Chrysosplenium oppositifolium* (fig. 775) forms patches of considerable beauty.

I have elsewhere alluded to the beautiful *Briza media* grass; also to the Water grass and to the Reed, which grow in our brooks

FIG. 775.—Chrysosplenium oppositifolium.

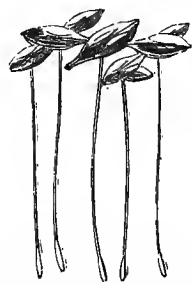


FIG. 776.—Ivy-leaved Duckweed.

FIG. 777.—Lesser Duckweed.

Those weeds already described, taken together, form a choice flower-garden of themselves, ay, and contain species of greater beauty and of greater variety than are to be found in some well-dug, well-hoed, and well-raked artificial flower-gardens,—continually interfered with by the gardener's art.

Besides these exquisite flowering weeds, there are others, interesting but unpretending. We have two Duckweeds in our water,—the *Lemna trisulca*, or Ivy-leaved Duckweed (fig. 776), and the *Lemna minor*, or Lesser Duckweed (fig. 777). In the water we have the beautifully foliaged *Callitriche* (fig. 778), which is always welcome in a trout stream,—forming charming leafy grottoes, in which the trout delight to dwell.

FIG. 778.—Callitriche (in water).

We have introduced into our waters one or two plants of the

Arrow-head plant (*Sagittaria sagittifolia*, fig. 779) from the Thames. In the river above Oxford this plant is very troublesome, and sometimes encroaches to such an extent as to impede navigation, as it grows completely across the river. The flower, however, is very beautiful, and the whole plant so interesting as to be worthy of culture.

Another water-side plant, the *Alisma Plantago* (fig. 780), is fine in its place, although not so beautiful as the Sagittaria. It comes up spontaneously at the edge of my backwater.

FIG. 779.—Sagittaria sagittifolia.

FIG. 780.—Alisma Plantago.

FIG. 781.—Epilobium hirsutum.

Along the whole of the banks of our river the *Epilobium hirsutum* fig. 781) grows as plentifully as we will permit it. This is another of those various plants that make the banks of the Thames more beautiful than any cultivated flower-garden. It does not grow so fine in my garden as it does on the banks of larger rivers, but looks rather straggling and weedy; nevertheless a plant here and there is ornamental.

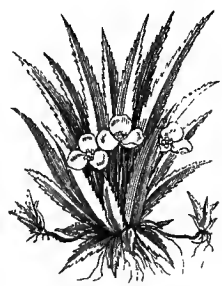


FIG. 782.—Water Soldier.

I have in a little pond the Water Soldier (fig. 782), a curious plant, which grows wild in some of the ponds on Clapham and Wandsworth Commons. In autumn little bulb-like buds are formed, from which new plants grow in the succeeding spring. I have also on the margin of the same pond the *Hydrocotyle vulgare* (fig. 783), which grows freely on Mitcham Common.

But now we have to speak of very troublesome weeds, which

grow where they are not wanted, and which interfere more or less seriously with horticulture. We are very much troubled with a lovely plant called the *Marchantia* (see Liverworts), which springs up in my artificial bogs and sandstone rocks, thereby destroying my bog plants.

Mr. Worthington Smith informs me that a very rare plant, *Damasonium stellatum* (fig. 783*a*), is found in pools on the commons near my garden. I regret to say that I am not as yet acquainted with the plant, although it has been thought desirable to give a figure of it on his authority.

FIG. 783.—Hydrocotyle vulgare.

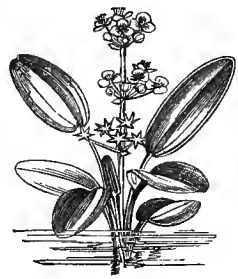


FIG. 783*a*.—Damasonium stellatum.

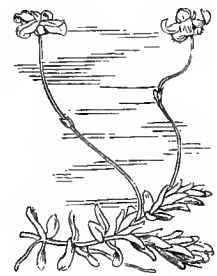


FIG. 784.—Anacharis.

We have as troublesome a plant, which lives in water, in the *Anacharis* (fig. 784), or, as sometimes called, the *Elodea canadensis*, as we have in the *Marchantia*, which lives on land. It is naturally a North American plant, and was first seen in this country in 1842, but it has now spread all over Great Britain and Ireland. It does not grow in very deep water, and prefers water with manure. Mr. Thornthwaite tried the experiment in one of my greenhouses of placing a weighed portion in distilled water, in the river water—which then received the sewage of Croydon,—and in a mixture of the two. In a short time the growth of the plant in river water far exceeded that of the plant placed in pure water, and that in the mixed waters had an intermediate growth. This shows that an important effect of preventing the pollution of rivers would be to lessen the quantity of this most troublesome plant. It is a trial of patience for a fisherman when his hooked pike gets into this weed. I was informed by Professor Owen that swans eagerly devoured the *Anacharis;* accordingly, acting upon his

advice, I procured some, and found the statement to be correct. We have now generally a good brood of young swans, which feed so greedily upon this weed, that but little remains in my water. The female plant alone exists in this country, and the flower is shown in the wood engraving.

Amongst the climbing plants we have the Bryony (*Bryonia dioica*, fig. 785), a plant which, when old, has a root as large as two or three parsnips. Its growth is particularly elegant, and an occasional plant is welcome amongst the shrubs.

FIG. 785.—Bryonia dioica.

Not so beautiful in growth, but having a finer effect in fruit, the Nightshade (*Solanum Dulcamara*, fig. 786) rears itself over the shrubs, and produces its enticing scarlet bunches of poisonous berries. It is so great an ornament amongst shrubs, that I have not the heart to extirpate it.

We have two beautiful flowering plants which are great pests, as they will make their appearance where they are not wanted. One is the common Convolvulus, or Bindweed, which in my garden attains the height of twenty feet in a single season, and then sends forth its charming white flowers. The best way to destroy it is constantly to pull off its young shoots during spring and summer. Doing this once or twice will not hurt the plant, any more than we hurt our asparagus plants by decapitating them; nevertheless, by perseverance the plant becomes exhausted. The other climbing plant which is a great pest to us is the Wild Hop, as it will pertinaciously grow over our hedges. It is very beautiful, but destroys the hedge, and so we are obliged to treat it as we do the Wild Convolvulus.

FIG. 786.—Solanum Dulcamara.

We are also troubled in places with that most exquisite flower the Lesser Bindweed (*Convolvulus arvensis*, fig. 787). This grows in the

highest possible luxuriance on the neighbouring chalk downs, where it attains a perfection unknown elsewhere. I love this weed for the beauty of its blossom, as well as for the delicious odour which the flower exhales. It does not, however, attain to so great a perfection in my garden as it does on the chalk hills.

Growing amongst my Sempervivums is the lovely *Potentilla Anserina* (fig. 788). The only mode of destroying it without disturbing our plants is continually to strip it of its leaves. It is one of the most beautiful of all the plants of its class, from the brilliancy of its flowers and the colour of its leaves, but yet amongst cultivated plants it must be ranked as one of the most noxious of weeds.

FIG. 787.—Convolvulus arvensis.

Amongst other weeds which we should like to entirely dispense with, although we have it to a very limited extent, is the Couch grass (see Grasses). Every portion of its root must be removed by turning over the ground repeatedly in summer. At Naples the underground stems of this, or of a species like it, form the chief food for the horses.

FIG. 788.—Potentilla Anserina.

FIG. 789.—Arum maculatum.

Groundsel and Chickweed trouble us, but a good gardener is always cutting off their heads, and so we are upon the whole very free from these weeds, considering that mine is a half-wild garden.

The *Arum maculatum* (fig. 789) is an interesting plant, that thrives in our hedge-rows. I have attempted to introduce, but without success, a small and curious species of arum from the shores of the Mediterranean, where it is, in some places, so thick as literally to cover the ground.

By the side of the Backwater, we have a grand and glorious weed, called the *Petasites vulgaris*. Johns speaks of it as the most pernicious of weeds, but growing as it does with us, it is one of the grandest of plants. The flowers come up in early spring, before the leaves, but afterwards the foliage appears, having more the character of tropical vegetation than that of a temperate region. The effect of the plant is well shown in plate 18, which represents the glorious mass of foliage that it exhibits in summer. This plant must be introduced in wild spots only where it can have abundance of space and ample moisture.

FIG. 790.—Water Dock.

Another fine foliaged plant is the *Rumex aquaticus* (fig. 790), which attains a height of six feet. We have a very fine specimen of it growing in the river at the park fence, which is remarkably handsome. The *R. aquaticus*, or Water Dock, is to be seen along the banks of the Thames, and it is one of those plants which impart a special character to the scene.

The Gigantic Parsnip (*Heracleum giganteum*) is a splendid plant for effect, in suitable positions. I have it in the garden, but not of the highest quality.

The Sow Thistle requires constant attention for its eradication, and the Creeping Ranunculus is a troublesome weed. The beautiful Thistle comes up in our fields, but the spade of the gardener always prevents it from seeding: thereby I am so merciless as to deprive my pet caged goldfinch—which continually enlivens me with its cheerful song—of this its favourite dessert.

> "Pro molli viola, pro purpureo narcisso
> Carduus et spinis surgit paliurus acutis."
>
> VIRGIL, *Bucolics*.

Of course grass will grow, but, as before mentioned, we are singularly free from troublesome weeds, thanks to the diligence of the gardener. Weeds need not at all times be profitless; for raspberries,

currants, and gooseberries come up from bird-dropped seeds. The ash and horse-chestnut appear in a troublesome way from the same cause, and the elderberry is a pest. I never have known, in my garden, an apple, pear, or plum tree to spring up spontaneously, though seedling peaches occasionally appear.

Amongst destructive weeds, I have seen the Dodder (*Cuscuta epithymum*, fig. 791) attack my cranberry plants, but only on one occasion. I was too pleased to have a specimen in the place to do it any damage; but as I did not destroy the dodder, the dodder killed my cranberry. It is a most destructive plant to clover, killing patches of it a yard in diameter. It has no roots, but lives by sucking out by dialysis the juices of the plants on which it lives.

FIG. 791.—Lesser Dodder.

In glancing at our weeds, it will be seen how far the presence of the river Wandle in the garden influences their growth, for the greater part of those which I have figured naturally flourish on the banks of a river or on ground adjacent to it.

THE ALGÆ.

"Spawn, weeds, and filth, a leprous scum,
Made the running rivulet thick and dumb."—SHELLEY.

We have many Algæ in my garden, which are interesting, as they represent the lowest types of vegetal life. On the palings of the Park and on the trunks of the trees a green dust is formed in winter, which is the *Protococcus viridis* (fig. 792). It is composed of minute cells, and a high magnifying power is required to examine them satisfactorily. Fig. 793 shows the plant magnified 600 times; for when increased only 100 times (fig. 792) the green dust still only appears to be composed of fine particles.

FIG. 792.—Protococcus viridis, × 100 diam.

FIG. 793.—Ditto, × 600 diam.

Creeping over the ground, immediately after the frost has passed away, we have a green mossy-looking growth (*Lyngbya muralis*), composed of very delicate fibres, which when magnified 100 diameters (fig. 794) appears simply to have transverse septa dividing the tubes, but when further magnified to 300 diameters (fig. 795) discloses its structure at every cell.

FIG. 794.—Lyngbya muralis, × 100 diam.

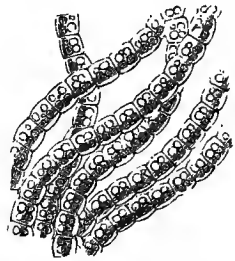


FIG. 795.—Ditto, × 300 diam.

FIG. 796.—Nostoc commune.

Later in the season, upon the gravel-paths after rain, a curious plant, called *Nostoc commune*, appears (fig. 796). It resembles a dark green jelly, and has a structure under the microscope which the engraving very well shows.

But the more important confervæ live in the water, and exercise an influence upon the state of the river. Early in spring the *Conferva rivularis* (fig. 797) appears. When seen by the naked eye, it has delicate

FIG. 797.—Conferva, rivularis, nat. size.

FIG. 798.—Conferva rivularis, × 100 diam.

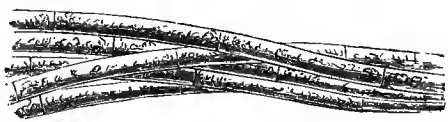


FIG. 799.—Conferva, × 50 diam.

long wavy threads; but when magnified 100 diameters (fig. 798), every thread is seen to be jointed, and has a cell in the interior of every division. The coarse conferva in fig. 799 shows well how fine the filaments of *C. rivularis* are when compared with other species.

By the sides of the brook a much coarser variety, called *Cladophora crispata*, appears, which is frequently a troublesome pest where we grow plants in pans of water in our greenhouses. The fibres are visible to the naked eye, and are branched, and not continuous, as those of *C. rivularis* are. Fig. 800 shows these fibres of the natural size, and also when magnified 100 diameters. In our Central stream and in our Backwater, in winter and in early spring, we have numerous specimens of the beautiful frog's spawn conferva, the *Batrachospermum moniliforme* (fig. 801), which is figured the natural size, and also when it is magnified 100 diameters. It is a much-esteemed object for the microscope. It is not a universal plant in streams, but enough grows in my garden to supply all the microscopists in England. It adheres to the stones in water about a foot deep.

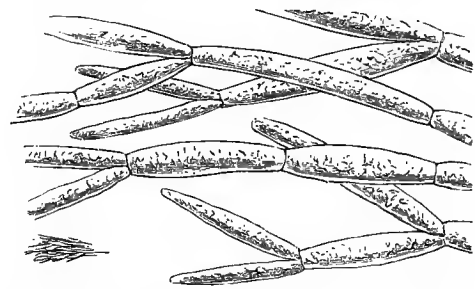


FIG. 800.—Cladophora crispata, nat. size and × 100 diam

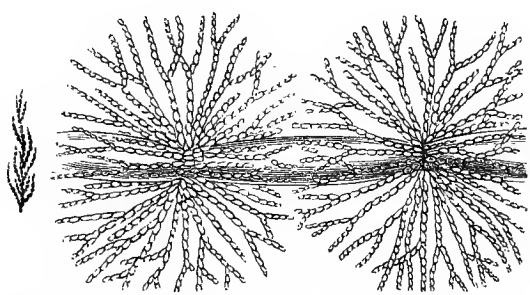


FIG. 801.—Batrachospermum moniliforme, nat. size and × 100 diam.

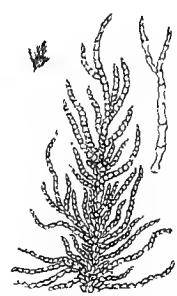


FIG. 802.—Cladophora glomerata, nat. size and × 100 diam.

Contrasting with this, which is of a dark colour, we observe here and there small quantities of the most brilliant grass-green wavy patches. This is the *Cladophora glomerata* (fig. 802), and a truly magnificent microscopic object it is. The arrangement of its fibres is barely visible to the eye; when, however, it is magnified 100 diameters, it shows well its branched form, and when further enlarged it exhibits its more intimate structure.

A more beautiful plant, and one more rare, is the *Draparnaldia glomerata* (fig. 803), which is remarkable in having a large central stem, from which other stems branch. This is also a superb microscopic object.

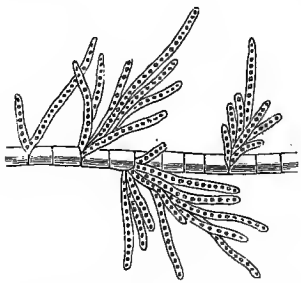


FIG. 803.—Draparnaldia glomerata, × 100 diam.

In March, bright green irregular patches of vegetal structure rise to the top of the water of the lake and of the Backwater. When examined by the microscope with a power of 100 diameters, they present to view a number of cells. This is called the *Tetraspora lubrica* (fig. 804). At the bottom of the river patches of bright green confervæ are found. These, when magnified by the microscope 100 diameters, show every filament to be jointed; and when further examined with a power of 400 diameters, a beautiful spiral structure is brought to view. I have hitherto not been able to discover any mode of permanently mounting this object, as, strange to say, it invariably shrivels, and loses its beautiful spiral

FIG. 804.—Tetraspora lubrica, × 100 diam.

FIG. 805.—Zygnema spiralis (upper fig. × 100 diam., lower fig. × 400 diam.).

structure. The name of this form is the *Zygnema spiralis* (fig. 805). About July it suddenly takes a start; and grows with such rapidity that I have drawn out associated filaments fifteen yards long. It covers the surface of the water with a dense scum, as is shown in plate 14. Thousands of water-insects and water-snails live in it. The trout resort to it, and the ever active call-ducks amuse themselves all day long with feeding on the creatures which live upon it. Sometimes we remove tons upon tons, but this is a great trouble and causes some annoyance, as when decomposing it smells disagreeably. The miller tried to make it into paper, but it was found that the fibre has no strength. When the September rains

come, it dies, breaks away, and passes down the river, to grow again and run the same course next year.

There are other confervæ in the river, such as the one magnified 50 diameters (fig. 799), but enough have been figured to show generally the characters of this class of vegetation. Towards autumn a curious process takes place with the confervoid filaments; two parallel fibres send out processes and unite together. This is called conjugation (fig. 806), and has some singular effect upon the cells of the fibres themselves, which results in a discharge of spores, from which the plant is reproduced the next year. The engraving is taken from a drawing by the late eminent microscopist Mr. Quekett.

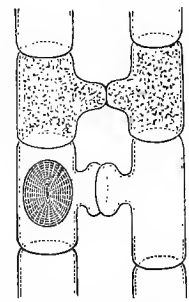


FIG. 806.—Conjugation of Confervæ.

After the Algæ we have plants of much interest and great microscopical beauty, called Desmids. These are not very numerous in my garden, as they prefer little pools the temperature of which is higher than in my streams; but we have some six or seven species in small quantities: the character of our water evidently does not suit them. Their use in the great scheme of creation is unknown. I have given the figure of *Closterium Leibleinii* (fig. 807) as an example of this kind of plant life.

FIG. 807.—Closterium Leibleinii, × 150 diam

After the Desmids there is an extraordinary group of plants called Diatomes (figs. 808 to 814), of which systematic writers make many genera, which literally abound in my garden. If we look one day at our rippling brooks, the pebbles are as bright as the ornaments in a well-kept drawing-room, but if we look a few days afterwards they are covered apparently with dirt and slime. Not so, however; that seeming dirt and slime is vegetal organism, replete with interest, and is called a diatome. Some persons have considered these plants to belong to the animal kingdom, so obscure is their purpose, but all

diatomes agree in having a silicious skeleton. This skeleton has been more observed than the organism itself, and there are many microscopists who devote their time to the observation of the beautiful marking on this silicious body. Mr. Müller, a German, sells as an

FIG. 808.—Epithemia turgida, × 200 diam.

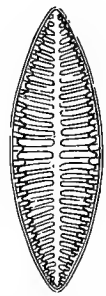


FIG. 809.—Surinella biscriata, × 200 diam.

FIG. 810.—Cocconema lanceolatum, × 200 diam.

FIG. 811.—Pinnularia major, × 200 diam.

article of commerce a microscopic slide containing four hundred of these silicious particles for four guineas, which is perhaps one of the most marvellous feats in microscopical manipulation which has ever been accomplished. Mr. William Thornthwaite has particularly examined the diatomes in my garden, and has noticed about fifty species. Every season seems to have its particular variety, which comes and passes away with great rapidity. As the plant life of these vegetals is

FIG. 812.—Cymelopleura solea, × 200 diam.

FIG. 813.—Pleurosigma attenuatum, × 200 diam.

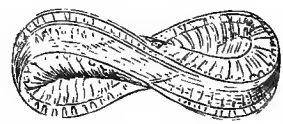


FIG. 814.—Campylodiscus spiralis, × 200 diam.

quite unknown, and as the cause for the variation in the form and figure of the silex is equally unknown, the study of the diatomes

in my streams would afford occupation for a long lifetime. At present the microscopists are only upon the fringe of the subject. They have not discovered the accurate and complete natural history of a single diatome. These silicious plants have been so common in some part of the world's history that thick fossil beds of great extent have been discovered which are one mass of them. At Richmond in America there is a bed of these fossils twenty miles long and several feet in depth. Polishing powders usually contain these silicious particles, and guano is said to contain a large proportion. As there is reason to suppose that some fish use them for food, I have caused the intestines of young trout to be examined for them, but without success. In the natural state they are more beautiful than in the dead skeleton form which is so attractive to many members of the Microscopical Societies. The *Melosira varians* looks like a number of hat-boxes placed end to end. The *Meridion circulare* resembles a wheel with its spokes. The *Diatome vulgare* resembles a flight of stairs. The examination of the growing species in our little streams is replete with interest.

MOSSES.

There are not many species of Moss in my garden, although between four and five hundred species are found in Great Britain. We have, however, in the river, growing abundantly in some situations, the *Fontinalis antipyretica* (fig. 815), which contains so much silex that it is used by the Laplanders to prevent their wooden houses from burning.

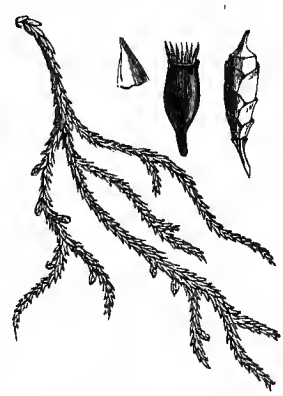


FIG. 815.—Fontinalis antipyretica.

The *Funaria hygrometrica* (fig. 816) grows freely in my garden, and is an interesting object.

To observe this class of the lower plants more attentively, a mossery has been planted in the Fern-glen; but an unforeseen difficulty occurred which never could have been anticipated:

blackbirds have found it out, and scratch up my mosses as badly as, if not worse than, chickens.

One great favourite of mine, *Mnium undulatum* (fig. 817), which is as beautiful as any filmy fern, I grow under glass. I have figured

FIG. 816.—Funaria hygrometrica.

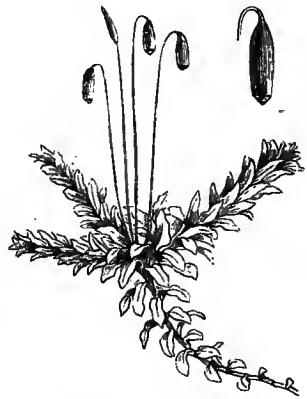


FIG. 817.—Mnium undulatum.

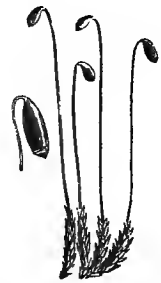


FIG. 818.—Mnium cuspidatum.

also another species, *M. cuspidatum* (fig. 818), a little moss which grows freely with us over rocks and stones. *Sphagnum* (fig. 819) does not grow out of doors with me, although I have planted it again and again. This is extensively used in the growth of our orchids.

FIG. 819.—Sphagnum acutifolium.

FIG. 820.—Hypnum ruscifolium.

FIG. 820. *a*—Hypnum splendens.

We have in our streams the *Hypnum ruscifolium* (fig. 820). It grows completely under the water, and the specimen from which the

drawing was made was taken from one of the sources of the Wandle in Carshalton village.

A very common Hypnum or Feather Moss creeps over our stones and wood, and growing as it does in winter, when vegetation naturally rests, affords us an object for admiration and study, when flowering plants have ceased their growth.

We have also other common mosses, as *Pottia truncata*, *Bryum intermedium*, *Tortula muralis*, *Ceratodon purpureus*, *Hypnum serpens*, *H. rutabulum*, and *H. splendens* (fig. 820*a*).

The experience gained in my mossery has convinced me that with knowledge, skill, and attention, it is practicable, although difficult, to establish such an appendage to the garden; and I trust that hereafter no horticulturist will dispense with the mossery.

LICHENS.

The Lichens are a class of plants allied to the Algæ on the one hand, and to the Fungi on the other. I once thought that we had only two or three species, but a lichenologist, the Rev. J. M. Crombie, in a morning's walk speedily discovered a dozen kinds. The lichens have been supposed to live entirely upon the atmosphere, and to derive no nutriment from the plants, stones, or sticks to which they

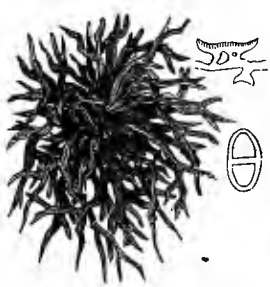


FIG. 821.—Ramalina fastigiata.

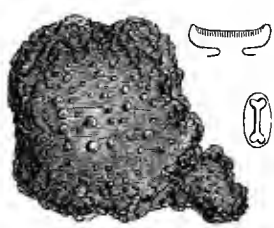


FIG. 822.—Physcia parietina.

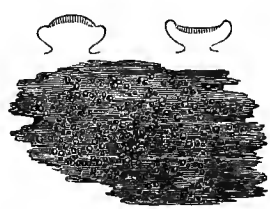


FIG. 823.—Lecanora subfusca.

attach themselves; nevertheless, they appear to be very hurtful to plants, and therefore I should imagine that they abstract some nourishment from them. On the apple-trees we have at least two species. The species which I have figured from my garden are—*Ramalina fastigiata* (fig. 821), which grows on old trees; *Physcia parietina*

(fig. 822), which grows on fruit-trees in several places; and *Lecanora subfusca* (fig. 823), which also grows on fruit-trees. Some species are found on the walls and dead wood of the bridges. There is a species which grows on the trunk of a large willow-tree, which in one stage of growth appears as a large white patch. It appears to grow suddenly in mid-winter, when the pure white colour of the circular patches is very striking and remarkable. On the hills above Heidelberg the trees are covered with lichens of large size; but wherever lichens attacked the boughs of the trees they died: whether or no this was caused by the lichens, I had not sufficient facts upon which to form an opinion. My attempts to cultivate the lichens have not at present been attended with success, either out of doors or under glass. Six hundred and fifty-eight species live in England.

"Retiring Lichen climbs the topmost stone,
And drinks the aërial solitude alone."—DARWIN.

LIVERWORTS.

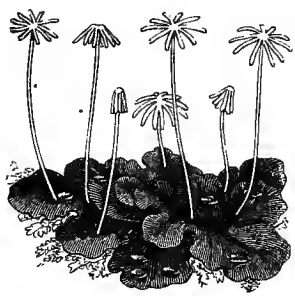


FIG. 824.—Marchantia.

I have already noticed the Marchantia (fig. 824) amongst the garden weeds. The *M. polymorpha* covers all the blocks of sandstone out of doors as well as in the glass fernery. It is, however, a very beautiful plant, especially when in fruit, and would be much more highly esteemed if we had not a great deal too much of it for the due preservation of our other plants.

FUNGI.

"And agarics and fungi, with mildew and mould,
Started like mist from the wet ground cold;
Pale, fleshy, as if the decaying dead
With a spirit of growth had been animated!"—SHELLEY.

A certain knowledge of Fungi is indispensable to the horticulturist, and but few of us who cultivate plants have as much knowledge

as we ought to have upon so important a point. There are nearly 3,000 species reputed to belong to Great Britain; so after making a reasonable allowance for a multiplication of species, there remains a larger number than the ordinary horticulturist can be expected to master in detail. Some fungi are good articles of food, as the mushroom, morel, and truffle, without which no *recherché* dinner at the present time can ever be said to be perfect: others are suspicious, and none should ever be eaten unless the name and character of the fungus is known. There is even reason to suppose that fungi ordinarily eatable, sometimes, from some unknown reason, become poisonous. In structure fungi are composed of interlacing longitudinal fibres, which always grow from the end, and are divided by septa at right angles to the axis. These cells never divide longitudinally; in fact, the structure consists of closed tubes placed end to end. This structure is called the mycelium. After a time, cells are developed at right angles to the mycelium, and these produce spores, which generate (fig. 122). This is the second method of propagation. Lastly, bodies analogous to zoopores are formed, which have the power of moving about and attaching themselves to a suitable material, when they reproduce the species; and this is the third mode of propagation.

The first fungus which is worthy of notice is the ordinary Yeast fungus *Torula cerevisiæ* (fig. 825), which is present in all fermenting liquors. It consists of cells which propagate by other cells forming on their exterior. It is the active organism in the production of vinegar from sugar. It is probably only a condition of the next described fungus.

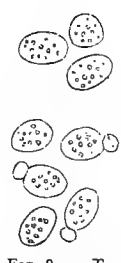


FIG. 825.—Torula cerevisiæ, magnified.

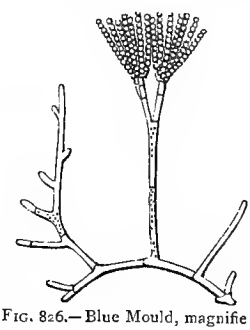


FIG. 826.—Blue Mould, magnifie

The second fungus which it is important to notice is the *Penicillium glaucum*, or Blue Mould (fig. 826), which covers most decaying substances. It throws up at right angles to the mycelium heads which are covered with spores.

Our root-work is the *nidus* of numerous fungi. The *Trametes gibbosa* (fig. 827), which grows from the stumps of old wood in our ferneries, is an example of this. Another species, the Tarragon fungus (*Agaricus euosmus*, fig. 828), grows in my garden. When first gathered

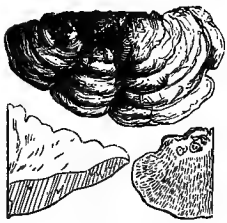


FIG. 827.—Trametes gibbosa.

FIG. 828.—Agaricus euosmus.

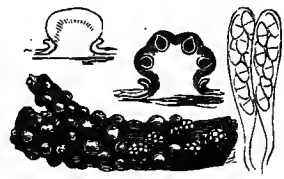


FIG. 829.—Tubercularia vulgaris, nat. size and magnified.

it smells like tarragon. It was particularly described by our veteran fungologist, the Rev. Mr. Berkeley. Many other species grow on our root-work. The smaller sticks often exhibit a beautiful small red fungus called the *Tubercularia vulgaris* (fig. 829).

The curious order *Myxogaster*, which is regarded by some persons as a connecting link between animal and vegetal bodies, is also found represented by the *Lycogala epidendrum* (fig. 830), which shows itself on the blocks of wood in the month of March. We have also the *Polyporus versicolor*, the woody *P. tomentarius*, and the large *P. squamosus* (fig. 848*a*). The *Xylaria hypoxylon*, the *Coprinus micaceus*,

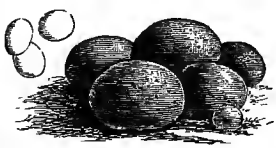


FIG. 830.—Lycogala epidendrum (spores × 700 diam.).

FIG. 830*a*.—Agaricus Candollianus.

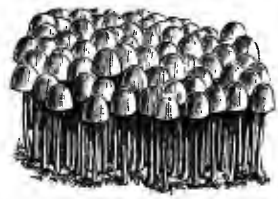


FIG. 831.—Agaricus disseminatus.

the *C. atramentarius* (fig. 851*a*), and the *Trametes gibbosa*, with the *Agaricus spadiceus*, and the rare *Agaricus Candollianus* (fig. 830*a*), grow upon, or in the neighbourhood of, the root-works.

The *Agaricus disseminatus* (fig. 831), with its little forest of mush-

rooms, is very remarkable, and may often be seen near decaying roots.

Growing in our highly manured ground, we have the curious *Peziza vesiculosa* (fig. 832). It has the singular property of shooting the spores out of the cup like a puff of smoke, which the engraving illustrates.

We have other fungi growing in manured ground, of which the Mushroom (*Agaricus campestris*, fig. 833) is a notable example. It comes up from time to time in different places about our garden, but I believe such developments have invariably an horticultural origin, from some mushroom bed having been thrown into the garden: we obtain the finest flavoured mushrooms from this source. The mush-

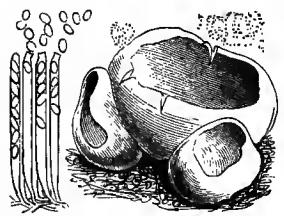


FIG. 832.—Peziza vesiculosa, showing dispersion of spores, and part of the hymenium magnified 100 diameters, showing spores emerging from the asci.

FIG. 833.—Mushroom.

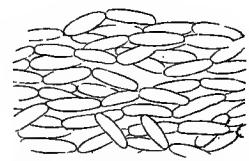


FIG. 834.—Cells of Mushroom magnified.

room is composed of a multitude of elongated cells, as is shown under the microscope (fig. 834). The cultivation of the mushroom is so important in a culinary point of view, that no garden can be said to be perfect if it does not yield a constant supply. We have never had sufficient quantity from my garden; yet when I attended to it in London we were never without mushrooms. Nothing can be easier than the culture of the mushroom if everything is rightly done, but any deviation from the right course is sure to be followed by signal failure.

To grow mushrooms artificially, fresh horse-droppings must be obtained from the stables. This material must be placed in covered airy sheds till thoroughly dry. The dry droppings are then rammed into a solid bed in any convenient outhouse, which will cause the material to heat. If the mass becomes too hot, it will be spoilt; but if it does not exceed blood-heat, pieces of spawn which contain the

mycelium of the mushroom, about the size of an egg, are inserted into various parts of the bed. The mushroom bed must then be kept perfectly dry for about six weeks, when, if all things have gone on well, the mycelium, or long threads of the spawn, will have run throughout the bed. During this period drought is absolutely necessary for success, and the house containing the bed should be kept at a temperature of about 60° Fahr. If, after the interval of six or seven weeks, the mushroom spawn has filled the material, the bed should be gently syringed with lukewarm water; but if too much water is given, the mycelium will rot. A few days after watering little buttons are formed, which in a few hours expand into mushrooms. The conditions above described must be strictly observed, for if one of them is varied failure is certain. Some years ago I experimented upon the growth of mushrooms, and soon attained to such perfection in their cultivation that I was able to raise a crop of mushroom buttons in a soup-plate placed in the wine-cellar. Some gardeners cover their mushroom-beds with loam, but this is not necessary, and I have never done so.

In the fields there are many varieties of mushrooms of varying excellence, and likewise some cultivated varieties far surpass others, so that any spawn which does not prove to be of the highest quality should be discarded. Any known good variety may be propagated to an indefinite extent by the mycelium (fig. 123), as other varieties may appear by sowing the spores (fig. 122). The material called mushroom spawn is usually made of horse-droppings formed into masses shaped like bricks, through which the mycelium is allowed to penetrate.

A mushroom-bed will last till the animal matter of which it is composed is exhausted, therefore the duration of the bed must depend upon the rate at which the mushrooms are developed. Warmth and moisture cause the mushrooms to grow faster, and the bed to be sooner exhausted.

"Pratensibus optima fungis
Natura est: aliis malè creditur."—HORACE, *Satira* iv.

Allied to the mushroom we have a fungus called the Champignon (*Marasmius oreades*, fig. 835). This grows in rings, and is reputed to be excellent eating. Berkeley says that it is even finer in flavour than the mushroom. Nevertheless a woman and two children who partook of some at Plymouth last year were seized fourteen hours afterwards with symptoms of poisoning: vomiting and purging occurred, followed by delirium in the mother and convulsions in the children. The children, aged six and thirteen, died three days afterwards, but the mother gradually recovered. Some of the fungi were sent up to Mr. Worthington Smith, and that fungologist immediately ate half-a-dozen, after having cooked them. Within an hour or two the usual symptoms of poisoning came on, with burning of the throat, irresistible depression of spirits and disordered stomach, which, fortunately for him, gradually passed off without more serious consequences. For years I have attempted to discover a test for the discrimination of wholesome from poisonous fungi, but have utterly failed. One eminent fungologist recommended me to apply the juice to my tongue, and if found acrid to discard the fungus. If the fungus smells disagreeably, it should be thrown aside. The fungophagists speak of tons of valuable food being wasted through neglect of fungi as articles of diet; but considering that the poisonous have to be distinguished from the wholesome among very numerous species, I am of opinion that we are not justified in urging people to eat fungi indiscriminately, and would rather recommend them to confine their choice to the mushroom, morel, and truffle. Even these do not at all times agree with every person. Mr. Worthington Smith annually attends the Hereford Fungus Festival, where earnest fungologists have a fungus banquet, and therefore he must be regarded as a promoter of fungus-eating. Nevertheless this eminent fungologist, with his family, were nearly poisoned by eating another fungus, the *Agaricus fertilis*. The cooked specimen scarcely weighed half an ounce, and yet Mr. Smith, his wife, and child suffered severely through it. Mr. Smith states that the gastronomic qualities were excellent, so

FIG. 835.—Champignon.

that the senses of smell and taste afforded no indication of its poisonous qualities. The symptoms which the poison produced were swimming of the head, nausea, vomiting, and prostration. Deep but uneasy sleep followed, and perfect recovery did not take place for ten days or a fortnight.

The Ergot of Rye (fig. 835*a*), which is produced by another fungus called the *Claviceps purpurea*, and which lives upon rye and other grasses, exercises the most terrible effect on the human economy, by producing a disease called ergotism, which has been fully described by Thompson in his Lectures on Inflammation. A surgeon who is a frequent visitor at my garden was continually advocating the use of fungi for food; so when preparing this chapter I took the opportunity of writing to him to ask distinctly whether he had ever partaken of any; and then

FIG. 835*a*.—Ergot of Rye.

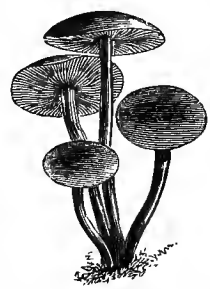


FIG. 836.—Agaricus fascicularis.

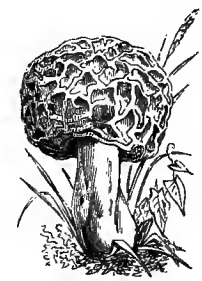


FIG. 837.—Morel.

I had a confession that he had not, and I earnestly warned him not to recommend persons ignorant of their nature to partake of them. I go much further, and state that cheese infested with fungus is not desirable, and that food, whether animal or vegetal, with fungus upon it, especially when cholera is prevalent, should never be eaten.

In the Fern-house the *Phallus impudicus* (fig. 840) grows, and in its decay gives rise to a very offensive odour, which fills the air of the whole house. *Agaricus fascicularis* (fig. 836), a poisonous fungus, bitter to the taste, also grows with it.

The Morel (*Morchella esculenta*, fig. 837) grows in my garden, especially under large elm-trees. In some years we have had great abundance, and in most years we have some. It is highly esteemed

in France, but is not much employed in this country, though I have occasionally seen them for sale at Covent Garden Market.

Mr. Worthington Smith first pointed out that the *Morchella crassipes* (fig. 838) was a native of this country. This appears occasionally in our garden.

FIG. 838.—Morchella crassipes.

The Truffle (*Tuber æstivum*, fig. 854*a*) is found abundantly at the "Oaks," in the next parish. It is a fungus which grows underground under the shade of certain kinds of trees, preference being given to the beech-tree. It likes a stratum of loam lying over chalk. It is found by persons who specially devote their time to this object. There are but few truffle-hunters in this country; nevertheless I found one after some trouble, and persuaded him to take me out for a day's hunt. He had an active little dog, that was trained to find the truffle by scent; a bit of cheese was given to it whenever it found one. To train the dog at first, a truffle was placed in an old shoe, and its food depended on its finding out where it was. When we went out the dog was told to hunt. It immediately ran backwards and forwards, and as soon as it smelt the truffle, scratched the earth with its fore-paws, when its master raised the soil and took it out. In two or three hours we found about three pounds in weight, and during the whole day the dog never made one single false point. The French truffles (*T. bituminum*) give off a more poweful odour than the English. At the Palais Royal they fetch fifteen francs a pound, whereas our English tubers are sold for half-a-crown. They have never been successfully grown in gardens, but it is said that in France, by sowing the outside of truffles amongst evergreen oaks, they have appeared.

The Giant Puff-ball (*Lycoperdon giganteum*, fig. 839) grows in my garden and in its immediate vicinity. It attains an enormous size

at some places, but not at my garden, and is said to be edible when young. I have been assured that, cut in slices and fried, it is excellent, but I have never tried it myself.

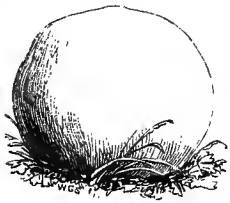


FIG. 839.—Giant Puff-ball.

FIG. 840.—Phallus impudicus (Fruit × 700 diam.).

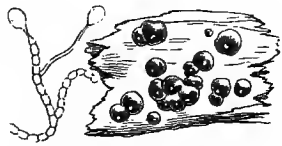


FIG. 841.—Dacrymyces stillatus and Sporophores, magnified.

I am not certain whether the *Phallus impudicus* (fig. 840) has ever appeared in my garden, but I have seen it in quantities in the month of August at the Kew pleasure-grounds. If cut in half, both parts continue to grow in a damp atmosphere. When mature, it exhales the most disturbingly offensive effluvium.

Some fungi dry up, and swell again when moistened by rain. This is the case with the *Dacrymyces stillatus* (fig. 841). One day I passed one of my bridges, when no fungus was apparent. A little rain fell, when on crossing the bridge a few minutes afterwards the woodwork was found to be covered with this species of fungus.

Many species of fungi grow upon the living leaves of plants, and do much injury to them. In early spring the leaves of our violets are affected with a fungus called the *Æcidium violæ* (fig. 842), which, on examination, proves to consist of beautiful cups. At my garden only a few leaves have been attacked by it, and I never knew extensive damage to arise from it.

During the spring of 1871 an æcidium was noticed on one of our Portugal quince trees, which had been some years in my garden. It has been pronounced by Mr. Worthington Smith to be *Æcidium cydoniæ* (fig. 843), a species new to this country, though known to foreign fungologists.

One form of fungus has attracted much attention of late years, as it has been represented to be the cause of the potato disease. From my own observations I believe that an aphis invariably punctures the leaf before the attack of the fungus. It is possible that the punctures

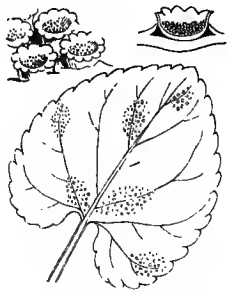


FIG. 842.—Æcidium viclæ, nat. size and magnified.

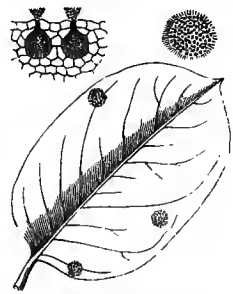


FIG. 843.—Æcidium cydoniæ, nat. size and magnified.

FIG. 844.—Potato Fungus, magnified.

of the insect allow the zoospores of the fungus which have ciliæ to penetrate into the interior structure of the leaf, whence the mycelium spreads into every part of the texture of the plant. The fungus appears as a white powder to the eye, but, when examined by a microscope, the white patch proves to be a forest of little branching stems surmounted by oval bodies. It was called by Berkeley *Botrytis infestans*, and now the genus is named *Peronospora* (fig. 844).

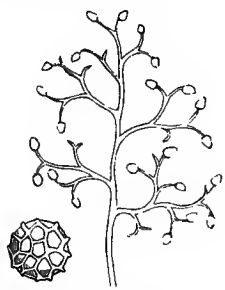


FIG. 844*a*.—Peronospora viciæ, magnified.

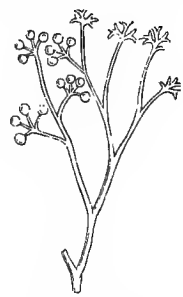


FIG. 845.—Lettuce Mould, magnified.

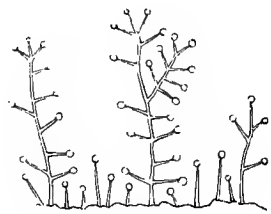


FIG. 846.—Acremonium, magnified.

Parsnips are attacked by another species of Peronospora, namely, *P. nivea ;* onions by a third, called *P. Schleideniana ;* peas by *P. viciæ* (fig. 844*a*) ; lettuces by *P. gangliformis* (fig. 845) ; cabbages by *P. parasitica ;* and spinach by *P. effusa.*

My *Todeæ* have sometimes been attacked by a microscopic fungus, the *Acremonium* (fig. 846). It is a beautiful object under the microscope.

The parts of the fronds which are attacked by this fungus die, and the whole constitution of the plant is much injured.

At my garden, and over the entire neighbouring district, we have had many attacks of the *Oïdium Tuckeri* (fig. 847) upon the leaves of the vine and the berries of the grape. Berkeley, and other learned fungologists, consider it to be a form of *Erysiphe*. The mycelium overruns the vine-leaves and encircles the grape berries, the fibres interlacing over the surface. It flourishes in the driest weather, and is not promoted by wet, as some persons consider. The whole vine, when infested with it out of doors, appears as if dusted with white powder. Every good gardener should daily inspect his vines when growing in houses; for if the fungus goes very far, nothing can save his crop of grapes. My vines in the orchard-house are more attacked than those in the turf-house and grapery. This fungus has done great damage in Spain, Portugal, and Madeira; the great vine at Hampton Court has also suffered from it. When the berries are attacked at an early stage of growth, they drop; if later, they grow, but generally burst. To destroy it the moment it appears, a little flour of sulphur should be sprinkled over the hot-water pipes, and gentle heat maintained at night. In very severe cases sulphur may be carefully burnt; but too much will destroy every leaf. I have also burnt with good effect the bi-sulphide of carbon in a spirit-lamp; it is, however, a powerful and dangerous remedy, and requires great care not to use too much. To destroy this fungus we now sometimes use the bi-sulphide of lime, which is a liquid, and can be carried about the house, or some may be placed in a saucer; it is very effective for the destruction of all fungi.

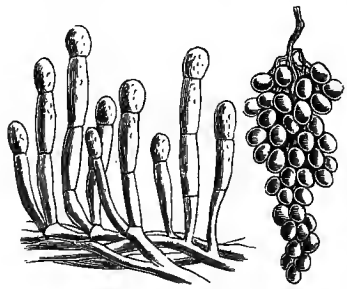


FIG. 847.—Oïdium Tuckeri on Grapes, nat. size and also magnified.

Sulphur on the pipes is an infallible cure, but if applied too early it is of no use, if too late the grapes will surely be spoiled; if an excess be employed, the black grapes will be colourless and flavour-

less; and if a great excess is used, the leaves of the vines will be damaged: therefore the application of sulphur requires judgment and skill.

Mr. Gassiot pointed out many years ago that the cost of the flour of sulphur in vineyards would be more than the fee simple of the estate on which the vines were grown.

Unlike the fungus attacks of the potato, beet, turnips, or cabbages, I have never seen the grape-vine fungus preceded by the puncture of any aphis, and perhaps it lives more upon the exterior of the plant than on its inner structure.

Closely allied to the grape-vine fungus, we have various species of the genus *Erysiphe*, attacking the hops and other plants. *E. pisi* or *Martii* (fig. 848) lives upon the leaves of peas, and is very troublesome to the gardener. It is only in the latter part of the year that this pest is so destructive, and at my garden we suffer most severely from the pea mildew in dry autumns, when the whole haulm looks as though it were dusted over with fine chalk: when this occurs, the cultivation of the pea is impossible, as there is no known remedy for this disease.

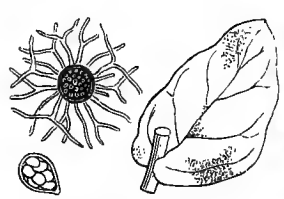


FIG. 848.—Erysiphe Martii, with Spores magnified.

FIG. 848*a*.—Polyporus squamosus.

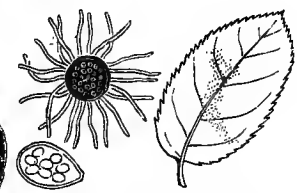


FIG. 849.—Sphærotheca pannosa, with Spores magnified.

Although our rose-trees are generally the very picture of health, yet they are occasionally stricken with blight, and the leaves look as if they had been dusted over with flour. This species of fungus is called the *Sphærotheca pannosa* (fig. 849). The Rev. Mr. Berkeley supposes it to be a condition of *Cladosporium dendriticum.*

In the year 1871 the hybrid perpetual rose-trees were much affected by a red fungus (*Coleosporium pingue*, fig. 850). The leaves which were attacked prematurely dropped. It was first observed at the end

of May in Devonshire, and in my garden at the beginning of June; it increased throughout the summer, and in September the trees were in a terrible state.

Our cabbages, cauliflowers, shepherd's purse, and other similar plants, are sometimes attacked with spots of white rust (*Cystopus candidus*, fig. 851) on the leaves, arranged in a circular manner. The mycelium

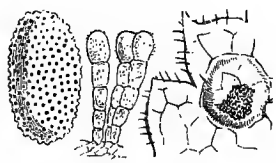


FIG. 850.—Coleosporium pingue, nat. size and magnified.

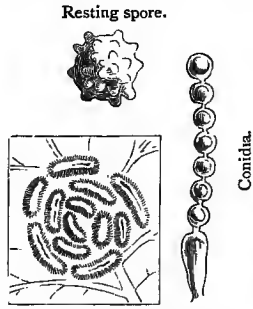


FIG. 851.—Cystopus candidus, nat. size and magnified.

FIG. 851 *a*.—Coprinus atramentarius

creeps through the cellular tissue of the plants, and after a time gives rise to zoospores or moving bodies to perpetuate the species. I believe that in all these cases the plant is previously pierced by an aphis.

Our sweet-williams are frequently attacked on the upper surface of the leaf with jet-black spots, which is a fungus called the *Puccinia lychnidearum* (fig. 852). This species also attacks other species of *Lychnis*.

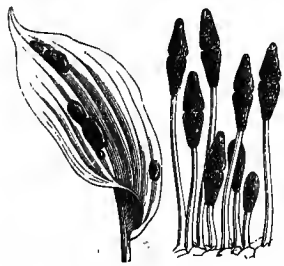


FIG. 852.—Puccinia lychnidearum, nat. size and magnified.

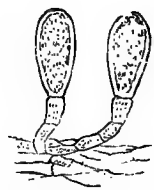


FIG. 853.—Helminthosporium pyrorum (× 700 diam.).

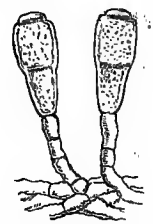


FIG. 854.—Siberian Crab Fungus (× 700 diam.).

The fruit-trees are subject to the attack of a black fungus, of which we note particularly two species, one the *Helminthosporium pyrorum* (fig 853), which attacks sometimes the Louise Bonne pear, and very frequently the Easter Beurré, causing the fruit to crack and prematurely rot; so that really it is a very important fungus to be

noticed by the pomologist. This fungus is described in Cooke's "Handbook of British Fungi" under the name of the *Cladosporium dendriticum.*

In my notice of the Siberian Crab, I mentioned how seriously the trees were injured in some years, as in the season of 1871. This is due to another fungus (fig. 854), allied to the *H. pyrorum*, but both Mr. Broome and Mr. Worthington Smith incline to the opinion that it is a species distinct from it. Mr. Smith writes to me that he finds the spores of *H. pyrorum* measure ·0004″ × ·0008″, whilst those of the Siberian Crab fungus measure ·0004″ × ·001″. The Rev. Mr. Berkeley thought the two were identical. There appears to me to be some little uncertainty about these fungi, which, as they are very important, deserve further attention.

The *Uredo filicum* (fig. 855) occasionally attacks our ferns. It seems to prefer the *Cystopteris fragilis* when growing in our outdoor ferneries. It is of a yellow colour, lives on the fronds, and almost gives them the appearance of golden ferns.

FIG. 854 *a*.—Tuber æstivum (spore × 250 diam.).

FIG. 855.—Uredo filicum (spore × 700 diam.).

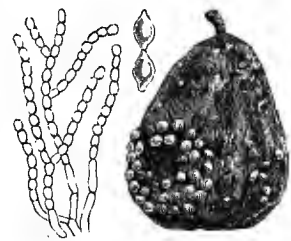


FIG. 856.—Oïdium fructigenum, nat. size and magnified.

Our plums and apples are attacked by a fungus called the *Oïdium fructigenum* (fig. 856), which rapidly causes the decay of the fruit. Millions of spores are given off, and it is curious that every fruit is not affected when exposed to the mischief; but as they are not, it seems as though some antecedent condition of the fruit was requisite to enable the fungus to grow. At the Fruit Committee of the Horticultural Society, late-kept apples and pears when cut open are often permeated with fungus, which renders the taste most disagreeable, although the outward appearance is good. For this reason I have directed my fruit-room to be well cleaned at the end of September, and then to have

sulphur burnt in it, so as thoroughly to destroy all fungus mycelium. During the winter I burn with good result a piece of sulphur, the size of a bean, sometimes daily and never less than twice a week. The Rev. J. Davies, of Moor Court, near Hereford, in a vituperative article in the *Saturday Review*, vol. xxxiv. page 195, states that "a drawback is the smatch of sulphur which clings to the fruit." Mr. Davies either could not have employed the sulphur or he used it improperly.

Berkeley states that the black specks which are common on apples, and occasionally multiplied so much as to make them unsaleable, are due to a fungus of the genus Spilocæa.

We do not escape the ravages of the Dry-rot, which is a fungus (*Merulius lacrymans*, fig. 857). A moist, still atmosphere is most favourable to its growth, and hence it is very destructive in cellars. To prevent its ravages, wood is sometimes soaked in corrosive sublimate or creosote, which is driven into the pores of the wood.

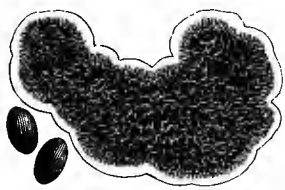


FIG. 857.—Dry-rot, with Spores magnified.

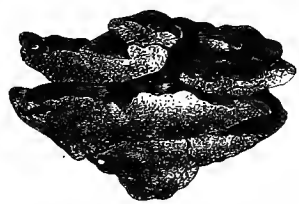


FIG. 857 *a*.—Trametes suaveolens.

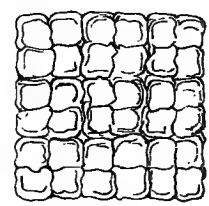


FIG. 858.—Sarcina ventriculi.

A current of air and free ventilation is an antidote to it. The vapour of burnt sulphur, or a solution of the bi-sulphide of lime, may also be used with advantage.

Our white willow trees (*Salix alba*) have been destroyed by a fungus, the mycelium of which spreads upwards from the root in sheets as thick as writing-paper, between the newly forming wood or cambium and the bark. At first the foliage of the tree becomes thinner, but afterwards the bark peels off in sheets, the new wood splits into irregular squares, and the tree perishes. The fungus itself has not been seen, but Mr. W. Smith thinks it may possibly be *Trametes suaveolens* (fig. 857*a*). The attached trees are also covered by the destructive Willow Aphis, an instance of the conjoined attack of aphis and fungus.

Various fungi live upon animal bodies as well as upon vegetal. Of the various fungi which attack man, the *Sarcina ventriculi* (fig. 858) may be mentioned as an example.

But one fungus, called *Saprolegnia* (fig. 859), is a great pest to us in the fish breeding season. It attacks the ova, and completely encrusts it, destroying the young trout inside. Some naturalists consider it to be an alga, others a fungus; it is very destructive to the ova of fish, and we find it necessary to remove every affected egg as soon as possible.

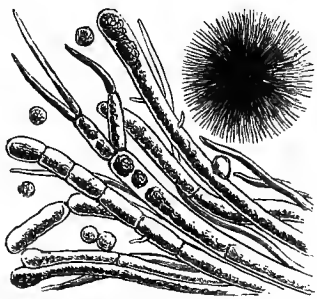


FIG. 859.—Saprolegnia on Ovum, nat. size, and x 20 diam.

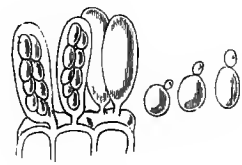


FIG. 860.—Ascomyces deformans, magnified.

The leaves of almond and peach trees are often curled and distorted. According to my observations, this is due to an injury inflicted by an aphis. The Rev. Mr. Berkeley, however, ascribes the result to a fungus which I have reproduced from his "Outlines of British Fungology," where he calls it the *Ascomyces deformans* or *Ascosporium deformans* (fig. 860). Every year this distortion of leaves occurs in my garden. I have not seen this fungus myself, but doubtless it is another instance of the association of aphis and fungus, so common in the garden.

MY FERNERIES.

It is always refreshing to walk from the set flower-garden—where, as Delille says, everything is symmetrical—to the wild garden, where everything is natural.

"Soin donc ces froids jardins, colifichet champêtre,
Insipides réduits, dont l'insipide maître
Vous vante, en s'admirant, ses arbres bien peignés;
Ses petits salons verts, bien tondus, bien soignés;

Son plan bien symétrique, où, jamais solitaire,
Chaque allée a sa sœur, chaque berceau son frère ;
Ses sentiers, ennuyés d'obéir au cordeau,
Son parterre brodé, son maigre filet d'eau,
Ses buis tournés en globe, en pyramide, en vase,
Et ses petits bergers bien guindés sur leur base.
Laissez-le s'applaudir de son luxe mesquin ;
Je prèfère un champ brut à son triste jardin."—*Les Jardins.*

For some years past Ferns and Ferneries have been much admired, and have received great attention from amateur cultivators; and with good reason, as their graceful forms are most attractive, their mode of growth interesting, and the colour of their fronds enchanting. Ferns should be grown by themselves, and not mixed with other plants, for several reasons, the principal being the necessity of a special situation for them, and their dislike to be interfered with. However, the Rhododendron, and especially the scarlet varieties of it, may be planted along with ferns as a fitting accompaniment; a climbing rose growing wild, or a single-flowering scarlet thorn, may also be employed with advantage. Before the fronds shoot out in spring I like to see the ground, in large patches, covered with masses of primroses at one spot, masses of snowdrops at another, masses of the wild oxalis at a third, and at other places carpeted with the wild hyacinth. It is not usual for me to mix these flowers together, as masses of colour, such as these flowers afford in their native woods, give variety to the scenery of the garden.

I have five outdoor ferneries and one indoor fernery. As a general rule, I think it advisable that they should be arranged below the level of the ground, and in a spot capable of drainage, as a uniform moisture to the roots is thus ensured. In a natural state, wherever we see ferns growing luxuriantly, there a bank of earth rises above them, so that the roots derive continuous moisture from water percolating through the soil. When this condition is reversed, and the ferns grow on the top of a mound, they are apt to die from drought. Whenever a stream of water can be introduced near the ferneries, it is desirable; ferns suffer no harm, but on the contrary derive great benefit, from the roots being occasionally flooded for a few hours.

Experience has taught me that ferns like an abundance of light, although it is necessary to screen them from cold winds. For this reason I always contrive that a belt of trees, or of rootwork or rockwork, shall surround my ferneries, and at the same time that the light of the sky may fall upon them from above without their being directly exposed to the fiery rays of the sun.

My Fern Glade is placed on one bank of the Backwater, and is screened from the sun by a row of nut-bushes to the south. Here many of the larger varieties of lady-ferns, interspersed with polystichums, broad ferns, mountain ferns, and scolopendriums, are grown. The royal fern flourishes near the river, but it is advisable to keep the crowns well above the water, as their roots like damp soil rather than wet. In the driest spots we grow polypody (*Polypodium vulgare*), and in the wettest the marsh fern (*Lastræa Thelypteris*).

The Fern Glen is a more elaborate artistic production, affording many delightful little views, and growing fine ferns. The whole is well sunk into the ground, with little rivulets running through, affording one or two boggy places. It is protected on the north by a bank, with a hedge interspersed with trees, and on the south by trees. A large willow-tree (*Salix alba*) on the south-west shades the sun's rays but still there is ample sky light overhead, which I find so desirable for the growth of all ferns. In this glen a very large *Osmunda regalis*, from Ireland, with twelve crowns, shows itself in great beauty. A lady-fern of largest size stands forth in a similar manner. The oak, beech, and limestone polypodies, with the *P. hexagonopterum* from North America, flourish. The *Adiantum cuneatum* grows, but does not stand the severest winters. The holly fern and the rigid fern likewise grow here, with *Athyrium flexile*, *Cystopteris fragilis*, *Asplenium trichomanes*, *A. Adiantum-nigrum*, *A. viride*, *A. Ruta-muraria*, and *A. septentrionale*. The three English filmy ferns grow under glass, and also one other, the *Hymenophyllum demissum* (fig. 861), from New Zealand.

FIG. 861.—Hymenophyllum demissum.

The more delicate varieties of lady-ferns fringe the path, associated with that delightful plant the sweet-scented gale; and here *Blechnum boreale* also abounds.

My Fern Glen has given me so much pleasure, that I strongly advise everyone who has a waste piece of land near his garden to make a fern glen. It will be a pastime in the winter evenings to design it; the construction of it—the transforming of the ideal conception of the mind into a living reality—will afford much pleasure; many a country trip in the woods will be required to furnish it; and when furnished it will afford a spot for contemplation and enjoyment, in which the designer may fancy that the robins, warblers, and nightingales, which never fail to dwell there, are pouring forth their gratitude for the construction of such a delightful retreat.

My Valley of Ferns is another spot in which I greatly delight. It has a stream through the centre, and it is well surrounded by trees. Here two or three varieties of male ferns and of polystichums attain their highest perfection. The magnificent struthiopteris raises its graceful and delicate fronds in the early spring, and shows its finely-coloured foliage when dying down in the early autumn.

In the heat of summer the beauty of a great mass of ferny foliage, such as this place affords, cannot be surpassed. The success of this valley of ferns appears to be due to the protection afforded from cold winds by surrounding trees, whilst the plants themselves luxuriate under light and sunshine, with free exposure to air without draught.

Near the Valley of Ferns we have a mass of artificial wall, on which wall ferns flourish, especially the *Adiantum Ruta-muraria*, *A. germanicum*, and *A. septentrionale;* and here Ceterach grows as well as I have seen it in Italy. We have also a cave for cave ferns, but I have failed at this spot in growing either the Irish, Tunbridge, Wilson's filmy ferns, or the *Todea pellucida*. Near the cave, the rare *Cystopteris montana* grows on a bank.

There is a spot devoted to Exotic ferns. There the North American ferns flourish, and live through the severest winters. The *Lomaria chilensis* is a grand fern, which never loses its leaves except in the

severest winters, and, for a wild fern, is unusually attractive in appearance. The *Cystopteris bulbifera* grows in the most vigorous manner, and, during the summer, most tropical ferns grow luxuriantly. The Exotic Fernery is well protected against every cold wind, but the sun is allowed to shine upon the ferns, which ripens the fronds and enables them the better to withstand the winter frosts. In this fernery the *Adiantum pedatum* is a strikingly beautiful object.

The fifth fernery, which is connected with the Valley of Ferns and with the Exotic Fernery, I call the Forest of Ferns, for in this place we arrange the tree ferns during the summer months. It is formed by an irregular dilatation of the Central brook, in which stand numerous sections of the trunks of large elm-trees, with holes in their centres, into which the tree ferns are placed during the summer season. The wood protects the roots of the plants from being over-dried, and moreover it conceals the pot in which the plant is grown. This plan of protecting the pot from the effects of the baking sun I learnt from Dr. Hooker at Kew, who places most of his pot plants in the great Palm-house in an outer earthen vessel for the same object. The beauty of a frond of an alsophila, many feet long when grown out of doors, has to be seen to be appreciated. The tree ferns are planted out the last week in May.

In my five outdoor ferneries I have three distinct classes of ferns firstly, those which remain in the ground the entire year; secondly, those which are bedded out during the summer; thirdly, those which are placed out in their pots and taken back to the greenhouses in autumn. A very large proportion of all ferns which are grown would be benefited by exposure to the pure air of heaven during the months of June, July, August, and September.

At this moment I have nearly every British fern growing out of doors, but I could never succeed in cultivating the *Asplenium marinum* in that situation. This fern grows wild by the sea-coast as far north as Aberdeen; nevertheless I have never been able to grow one in any of my outdoor ferneries. It is a remarkable fact that the *Adiantum Capillus-Veneris* (fig. 862) has never proved to be hardy with me, although I

have it now growing well in the Fern cave. I have seen it along the Mediterranean coast beyond Mentone, but only in particular situations, such as on a bed of sandstone, which is permeable by water: in this situation the fronds were severely frosted in winter. I saw a plant growing at the top of one of the churches at Genoa, at a time when all the fountains in the city were frozen. I noticed it, again, to be plentiful at Pompeii and at Herculaneum, and also in the ruins of Nero's palace at Rome. But nowhere was the maidenhair seen in such perfection as in the ruined amphitheatre at Pozzuoli, near Naples. The underground rooms and passages formerly used by the gladiators, and for the working machinery of the amphitheatre (which is the most perfect of any now

FIG. 862.—Adiantum Capillus-Veneris.

FIG. 863.—Hymenophyllum Tunbridgense.

FIG. 863 *a*.—Hymenophyllum Wilsoni.

existing), form a series of caves, through the walls of which moisture continually oozes, and here the maidenhair luxuriates in all its glory. Some of the fronds were eighteen or more inches in length, and the earthen walls were covered with sheets of this lovely fern, standing out at right angles from the wall or hanging down from the roof. I must confess that, when I beheld this great and glorious sight, I was more impressed with it than with the thought that I was present on a spot where dramas of blood were enacted centuries before. I speedily collected a number of plants, to the no small disgust of the *cicerone*, who could not do the amphitheatre at his usual gallop, and who shrugged his shoulders at my utter want of taste in gathering useless weeds. Some of these plants now grow at my garden in the Fern cave. The adiantum is said to luxuriate in the orange groves in Spain, in which country the fronds are used to make the syrup of

capillaire, a pleasant beverage drunk mixed with water in hot weather.

We have three British Filmy ferns. The *Hymenophyllum Tunbridgense* (fig. 863 I have found abundantly at Tunbridge Wells and in Sussex, and have had other plants from the Dart Moor: this and the *H. Wilsoni* (fig. 863*a*), which is found in Devonshire and Scotland, both grow well with me, but have to be planted in a particular manner. My plan is to take the plant, place it on a bed of coarse sand with a little peat, and sift fine dry sand between the fronds till it is completely embedded. A watering-pot is then held five or six feet above the plant, so that the water falls not only in quantity, but in considerable force, till the whole of the sand is washed in. The plant is then covered with a glass, and requires but little water. It grows out of doors perfectly well under glass, but not unless so covered. I have had fine specimens, which received the first prize both at the Botanic and Horticultural Societies; but the plants, after attaining a certain perfection, are prone to die off.

The Irish Fern (*Trichomanes speciosum*) has never succeeded with me out of doors without glass, but grows when it has that protection. There are several varieties of it, but I have one which was found by Mrs. Abel in Yorkshire, where it had not been seen for a hundred years previously. I have figured one of the fronds (fig. 864), which that lady herself gathered, and which is interesting on that account, but it gives a very poor idea of the beauty of this species. This plant is growing vigorously with me, and it also grows well in Mrs. Abel's drawing-room. It has been found by Backhouse and others in Wales, and it possibly exists in other parts of England but its most remarkable habitat is Killarney, whence it is called the Killarney Fern. Mr. Cooper Forster, who has a great love for filmy ferns, has a magnificent plant, which grows over a flint stone in his drawing-room in the centre of London. In 1871

FIG. 864.—Killarney Fern.

one of my finer specimens was severely injured, and the gardener states that it was attacked by rats, who used the fronds to construct a nest. I wish the animals would have contented themselves with a fern of less beauty. The sporangia of *T. speciosum* is very interesting and distinct (fig. 865).

FIG. 865.—Sporangia of T. speciosum.

Of the British Aspleniums, although I never could grow the *A. marinum* out of doors, it flourishes in the indoor fernery. Plants of the *A. trichomanes*, from Devonshire, grow luxuriantly in the Fern Glen. *A. viride* grows in the same situation, between two blocks of sandstone. In the Trossachs I met a collector with a splendid handful of *A. viride*, the fronds of which far surpassed those of my plants, and which showed the fern to be an exquisitely beautiful species. The *A. Ruta-muraria* grows at Highgate, Hampton Court, and all over the country, either in mortar, or where a calcareous spring deposits its chalky matter over the ground; I have gathered it in such a situation near Whitby. Although common, it is a difficult fern to grow, and I am constantly obliged to renew it. The *A. germanicum* (fig. 866) is very rare in England. Plants which were brought for me from the Black Forest by Mrs. Rennie have grown admirably; and I have also the *A. septentrionale*, from plants which I have brought from Edinburgh and from the St. Gothard Pass, on the Italian side, but which I find rather difficult to grow. The *A. Adiantum-nigrum* I have found on the Addington Hills, but not lately. It is a beautiful fern, and requires a spot constantly damp, though not wet. The *A. lanceolatum* has been brought to me, by Mr. Gray, from the Channel Islands, but I believe that I have never yet grown it successfully out of doors. The *A. fontanum* is a charming fern. It is difficult, if not impossible, to grow without the protection of a glass frame.

FIG. 866.—Asplenium germanicum.

The Hart's-tongue Fern (*Scolopendrium vulgare*, fig. 867) I grow in its natural state in such perfection that the fronds often reach two feet

in length. It is a truly magnificent evergreen fern, but attains its greatest perfection when a little protected from cold and damp to its fronds. I have hundreds of the common variety, and numerous examples of the different varieties which have been raised by horticulturists. In my judgment the common fern is the most useful for a garden, and upon the whole the most beautiful.

The *Ceterach* (fig. 868), an evergreen fern, grows as well upon my wall as it does in Italy. In that country it lives on the Apennines and on Mount Vesuvius, in situations where one would suppose that any living plant would be literally baked. It is, however, rather difficult to establish, and, until well rooted, requires slight perpetual moisture, though not too much.

FIG. 867.—Scolopendrium vulgare.

FIG. 868.—Ceterach officinarum.

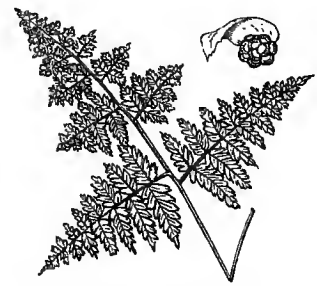


FIG. 869.—Cystopteris montana.

The two Woodsias, *W. ilvensis* and *W. alpina*, are rare. The former I grow in a sheltered cave between two pieces of sandstone, and the latter amid pieces of sandstone in a little frame which is covered with glass to protect it in winter.

All the English varieties of Cystopteris which are deciduous grow with me. I have found *C. fragilis* in Yorkshire, and it flourishes with me. The variety called *Dickeana*, from the valley of the Dee, is a good one, and so is *C. regia*, which requires a little shelter in winter. The *C. montana* (fig. 869) is a magnificent fern, rarely grown; however, I have a fine plant, which is really beautiful when in perfection. It should be so situated that the roots are constantly moist, but not wet.

It is impossible to have any successful fernery without abundance of the common Polypody (*Polypodium vulgare*, fig. 870). The number of hamperfuls which I have required and received from various friends is surprising. It is evergreen, and is employed to grow over our stumps of trees, on dry banks, and in various other situations. Its green leaves and golden-coloured spores render it invaluable for ferneries. There is also a beautiful variety called the *P. cambricum*, which, however, does not grow so freely as the common Polypody; the Irish fern, another beautiful variety; and many others, which differ but little from the normal form. The Beech Fern (*P. Phegopteris*) requires a damp place, and is a fine fern, though not equal to the Oak Fern (*P. Dryopteris*, fig. 870*a*), which is one of the finest of all. Both grow abundantly in Yorkshire and Scotland, and I have many in my Fern Glen. The Limestone Fern (*P. Robertianum*) has seeded in my orchard-house, and the plants give fine fronds. The *P. alpestre* resembles a lady-fern, and the variety *P. flexile* is a delicate fern, interesting to grow, but not at all showy.

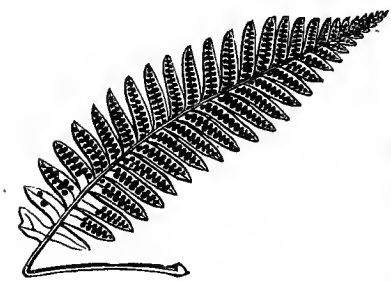


FIG. 870.—Polypody (showing sori).

FIG. 870*a*.—Oak Fern.

FIG. 871.—Parsley Fern.

The Parsley Fern (*Cryptogramma crispa*, fig. 871), a deciduous fern, is not easy to establish, probably because it is not removed with sufficient roots from its natural situations. I found a single fine plant on Don Side, but no other, showing how occasionally a species will grow away from its neighbours. It thrives best amongst the wall ferns, low down, so as always to have some moisture.

In all the ferneries the Hard Fern (*Blechnum spicant*, fig. 873*a*) is cultivated. It grows in most woods, and generally sprouts up on the moors both in Yorkshire and Scotland after the heather has been burnt. The

fronds are valuable for decoration in mid-winter. It grows and fructifies with me in great luxuriance.

Although the common Bracken (*Pteris aquilina*) grows so profusely that it is probably the most common fern in the world, yet it is difficult to transplant. To my mind it is exquisitely beautiful, and it lives in the back part of our ferneries sheltered by trees. It has, however, a creeping rhizome, and will travel rapidly where it likes. It is difficult to establish, and equally difficult to eradicate, which is a disadvantage. The stems when cut have a singular appearance, and abound in scalariform vessels (fig. 872).

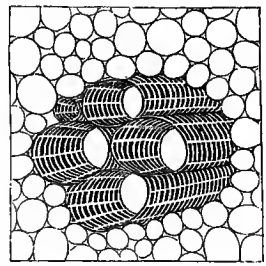


FIG. 872.—Scalariform vessels in Bracken.

In our outdoor ferneries for large ferns we cannot dispense with the Polystichums, which are evergreen, and should be largely grown. The *P. aculeatum* and *P. angulare* are probably only varieties of the same plant. The latter attains great size, and sends up fronds four feet high. There are many varieties of this fern, some of which are extremely beautiful. The variety of *P. angulare proliferum* has bulbils on the axils.

FIG. 873.—Polystichum angulare.

FIG. 873*a*.—Blechnum spicant.

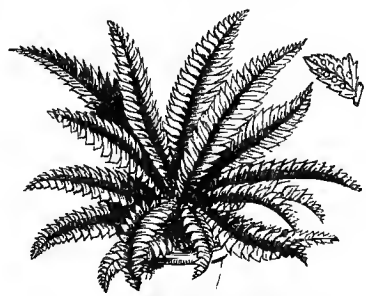


FIG. 874.—Holly Fern.

In early spring it is interesting to observe the polystichums unfold their fronds; for whilst the lastræas and many other ferns unfold their fronds from within, those of the polystichums are unfolded from without. The young frond of the polystichum (fig. 873) is a very beautiful object.

The Holly Fern (*P. Lonchitis*, fig. 874) is an evergreen fern of

great beauty. It is not easy to cultivate, though I have seen it in great perfection at the Rev. W. Macpherson's manse in Don Side. It is evergreen, and is a highly beautiful object when successfully grown.

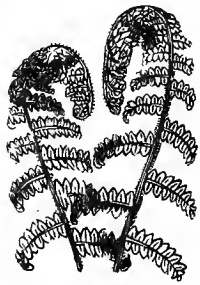


FIG. 875.—L. Filix-mas.

Like the polystichums, the different species of Lastræa, or Nephrodiums, are also indispensable. The *Lastræa Filix-mas* (fig. 875) attains a large size and a bold form, and, from its abundance, is well adapted to make the foundation of a fernery, for which purpose we use it. We grow several varieties, of which the crested and small kinds are the most important.

The Mountain Fern (*Lastræa montana*), although it occurs in large patches in Scotland, does not grow so freely in artificial cultivation. Its fronds die down early in autumn. The Yorkshire Hard Fern (*Lastræa rigida*) can only be obtained in small quantities, and therefore it is adapted for single specimens and not for a great show. The same scarceness of the *Lastræa cristata*, or Norfolk Fern, forbids it to be extensively used, although it is a beautiful fern. Another one, the *Lastræa æmula*, is also not sufficiently common to be used for other purposes than as specimens; but the *L. dilatata*, or Broad Fern, can be obtained in any quantity, and is remarkable for the manner in which the fronds are curved, and the picturesque effect which it presents in cultivation. Of this fern there are many varieties, several of which we grow.

FIG. 876.—Marsh Fern.

The Marsh Fern (*Lastræa Thelypteris*, fig. 876) is of great beauty, and grows admirably with me in wet places. The form of its long fronds is elegant, and its colour enchanting. I grow it largely, and certainly it deserves to be grown extensively. Its rhizomes grow to the very edge of the water without injury to the plant.

Of all ferns perhaps the Lady Fern (*Athyrium Filix-fœmina*, fig. 877) is one which we grow for effect in the greatest profusion: not only the large white and the red stalked varieties, but numerous kinds and seedlings, are also cultivated in quantity. Lady-ferns like plenty of moisture and abundance of light, and then they are truly beautiful, especially in seasons when late frosts do not impair the foliage. Frequently spots attributed by gardeners to the rays of the sun arise from the action of cold, and I have known the hottest summers to produce the greenest fronds.

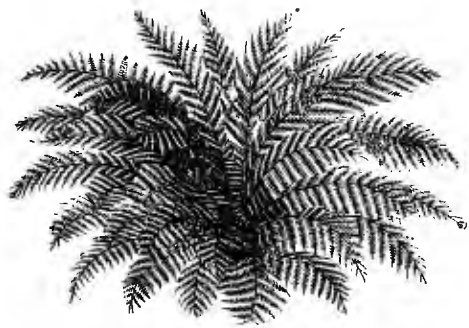


FIG. 877.—Athyrium Filix-fœmina.

Many of the varieties of lady-ferns so far deviate from the natural type as hardly to be recognizable, and I point out to my visitors that they are similar to the eccentric dresses which some ladies adopt when they patronize a fancy ball, being not one whit less uncouth and quite as extravagant.

One of the most important ornaments in our outdoor fernery is the *Osmunda regalis:* I have a splendid specimen from Ireland, another good one from Brentwood in Essex, and others from Devonshire. This fern requires plenty of moisture, but does not like its crown to be actually in the water; it requires also plenty of light. Its spores do not appear to ripen with me out of doors, though in the fern-house young plants readily grow from the spores. I have figured the sporangia (fig. 878). A variety called the *O. regalis cristata* is a splendid greenhouse fern, rivalling its parent.

FIG. 878.—Sporangia of O. regalis.

There are two other interesting little species of ferns, which we appear to have thoroughly acclimatized, the common Moon Wort (*Botrychium Lunaria*, fig. 879) and the Adder's Tongue (*Ophioglossum vulgatum*, fig. 880). Both are deciduous and pretty, but much too small to produce any striking effect.

The number of Foreign ferns which may be thoroughly depended upon to live out of doors during the winter, is small. There are three Osmundas. The *O. gracilis* (fig. 881), which, grown out of doors

FIG. 879.—Moon-Wort.

FIG. 880.—Adder's Tongue.

FIG. 881.—Osmunda gracilis.

in full sunshine, looks like a ridiculous, diminutive, stiff plant of the *O. regalis*, is drooping and more elegant when grown in a greenhouse. The *O. cinnamomea* and the *O. interrupta* are also more beautiful when grown in a greenhouse than when planted out of doors. The *O. interrupta* (fig. 882) is one of the most beautiful of all ferns when well grown. The fertile fronds are green for the upper few inches, then

FIG. 882.—O. interrupta.

FIG. 883.—Cystopteris bulbifera.

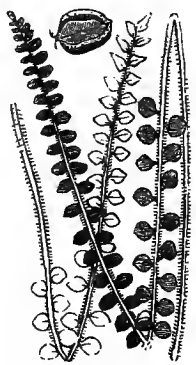


FIG. 883*a*.—Pteris rotundifolia.

the fructification appears, and, lastly, the remainder of the frond is green. The outer, or non-fertile fronds, form a series of curved lines

surrounding the fertile. I have occasionally observed fronds of the *O. regalis* partaking somewhat of a similar character.

The *Cystopteris bulbifera* (fig. 883) is thoroughly acclimatized with me. It multiplies by division, by spores, and by little bulbils formed in the axils of the leaves. It is a fern which should be grown in quantity.

Of the Polypodiums, the *P. hexagonopterum*, a good companion plant to the oak and beech fern, is well acclimatized. The *P. Braunii* is perfectly hardy.

The *Pteris scaberula* (fig. 884) lives in my outdoor exotic fernery, but has not flourished. It grows vigorously when planted out for the summer, and is most elegant. I exhibited a plant treated in this way at one of the meetings of the Horticultural Society, which delighted the lovers of ferns, and which received the special certificate of the Society. The common *Pteris serrulata* has survived many years of intense frost, and the *P. rotundifolia* (fig 883*a*) is far more beautiful out of doors than when grown in confinement, but yet will not stand the severest winters.

FIG. 884.—Pteris scaberula.

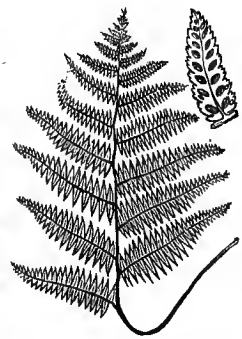


FIG. 884*a*.—Asplenium goldianum (var. pictum).

FIG. 885.—Lastræa Standishii.

Of foreign Lastræas or Nephrodiums, *L. curvata*, *L. Opaca* or *L. varia*, *L. Sieboldii*, and *L. patens*, all stand the severest winters; and of these *L. curvata* is particularly vigorous. There is a very fine plant from Japan, *L. Standishii* (fig. 885), which will live out of doors, but perhaps does better in a cold greenhouse.

The two Woodwardias, *W. orientalis* and *W. radicans*, have lived with me many years, nevertheless the fronds have every winter been cut down by frost. I do not doubt that in Devonshire and Cornwall

they would do perfectly well. The *W. radicans* is a truly noble fern, which forms other little ferns at the end of its fronds.

The *Doodia aspera* (fig. 908) thrives, and the leaves are handsomer than when it is grown in the indoor fernery, but severe frost kills it. One or two other small species of doodia flourish well.

The *Lomaria alpina, L. alpina major,* and *L. crinita* grow in the most satisfactory manner, and the *L. chilensis* (fig. 886) is one of the glories of the garden; its grand stiff leaves form a striking contrast with the other ferns, and it is an important addition to our ferneries. In the severest winters, as in that of 1870, its fronds were destroyed; but ordinarily they remain the whole year. When the fronds are destroyed in winter, fresh ones appear in spring.

FIG. 886.—Lomaria chilensis.

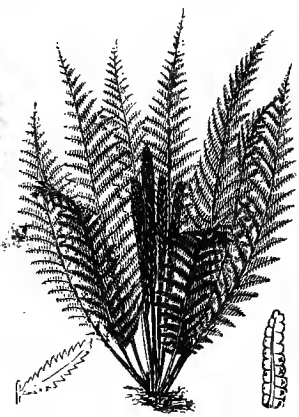


FIG. 887.—Struthiopteris germanica.

FIG. 887*a*.—Onychium sensibile.

One of the grandest of all hardy ferns is the *Struthiopteris*. Two species are described by botanical writers, the *S. germanica* (fig. 887) and the *S. pennsylvanica.* I cannot, however distinguish one from the other, and probably both supposed different species are really the same plant. The struthiopteris is one of the first ferns to come out in spring, and one of the first to decay in autumn. Its general form is that of a shuttlecock, from the centre of which the fertile fronds appear. Notwithstanding this habit of growth, it has a creeping rhizome, whereby a little forest is produced, of great beauty. This fern grows three feet high, and must be regarded as one of the

great attractions of an outdoor fernery. I have many plants, and many should always be grown.

Of all the acclimatized ferns, the Adiantums are remarkable for their beauty. I have already mentioned that the *A. Capillus-Veneris* grows with some difficulty. I find that *A. formosum* stands the hardest frosts, but throws up fronds only two or three inches high. However, the North American variety, the *A. pedatum*, is a plant of surpassing beauty; it throws up fronds about a foot high and then forms a flat top. Out of doors, it is not only one of the most beautiful of adiantums, but also one of the most lovely of all ferns. I have many specimens, and no fernery can be perfect without several of this splendid fern. It is not very commonly cultivated.

The *Athyrium* or *Asplenium goldianum*, var. *pictum* (fig. 884*a*), is a very beautiful fern, but not of sufficient size to be of great importance; nevertheless single specimens are charming. The *Nothochlæna Marantæ* is another excellent fern, which survives the hardest winters.

The *Onychium sensibile* (fig. 887*a*), the fronds of which turn brown upon the slightest touch, or upon exposure to the rays of the sun, lives as well in our climate as the common English ferns. We grow plants of the *Onychium japonicum* (fig. 897*a*), which do not thrive so well out of doors as some persons assert.

The *Davallia Novæ Zelaudiæ* lives through most winters, and the beautiful *Todea pellucida* through some; but both *T. pellucida* and *T. superba* and the fine filmy fern *Hymenophyllum demissum*, live out of doors with me if simply covered with a pane of glass.

The above list comprises nearly all the exotic ferns which can be safely depended upon, and the acclimatization of foreign ferns does not offer much prospect of large success.

There are numerous ferns which we plant out for the summer and take back to our houses, like bedding plants, in autumn. This plan admirably suits many tree ferns. In my forest of ferns I plant out *Cyathea medullaris*, which forms superb fronds many feet long, and which is much improved by this treatment.

The Woodwardias rejoice in their summer removal from the close

house to the pure air of heaven, and even the tropical *Hypolepis repens* grows with great vigour in the summer months. The *Platycerium alcicorne*, which is apt when in the house to be attacked by cocci, remains perfectly healthy in the Forest of Ferns; and *Pteris tremula*, *Nephrodium molle*, *Pteris vespertilionis*, and *Todea africana*, are much improved by their summer visit to their natural atmosphere. It is probable that most of the exotic ferns we cultivate would be benefited by being out from the 1st of June till the 1st of October, and it is my intention to try every species in that position as I obtain plants. Even the Indian fern *Pteris argyræa* does well in summer.

At my garden there is only one indoor fernery; but this, as I have already explained, has every gradation of heat, from the temperature of the equator to the lowest in which ferns can grow. By this arrangement we are enabled to have specimens of all the more important species of ferns in the world, so arranged that they can be seen at a glance (see plate 19). Experience, however, shows that every fern which can live permanently out of doors, or which can be placed out during the summer, flourishes better than when it grows under the artificial conditions and atmosphere of a glass-house. In this glass-house some ferns are grown in peat amongst blocks of sandstone, but the natural temperature of the earth and the rivulet which flows through the house is somewhat too low for vigorous growth. These conditions lessen my power to grow ferns planted in the house itself; and those who construct fern-houses should remember that exotic ferns require warm soil. Ferns are easily grown, but my collection once suffered great damage from the treatment of a gardener who neglected the conditions of healthy growth. Some ferns are grown in pots and in earthen pans, so arranged as to make but little show, and the first impression upon a glance inside the house is that the whole fernery is but a fragment of wild natural scenery covered with glass.

Many ferns are grown in circular wire baskets and suspended from the roof, or in baskets so shaped that they may hang against pillars or the sides of the house.

The earth usually employed for the culture of our ferns in pots is

peat mixed with coarse sand and pieces of broken pots. The Sheppey sand, although in our immediate district, is too fine for this purpose, and we employ that which comes from the Lower Green-sand at Reigate, or which may be obtained at Sandy in Bedfordshire, and which belongs to an epoch of the earth's history antecedent to the formation of the chalk hills (see Geology). Probably feldspar grit from the cross courses of Devonshire would be even preferable, as this material contains potash in union with silex. I have never ventured directly to give potash or any earthy salts to our ferns. Though potash is contained in the ashes of ferns, the exact proportion in each species is not known.

My indoor fernery, although so simply constructed, is really a lovely spot, and most of those who enter it for the first time are startled at the general effect. The red tiles of the paths, and the red passion-flowers, contrast with the green foliage on either side, and ferns which I have carried to my garden in my pocket have now grown so large that we sit under their shade as though they were trees.

In this fernery nearly every rafter has a climbing plant, and one or another of these is in blossom during the entire year. No Ovidian idea of eternal spring can surpass the reality of this my fern-house. Even when the country outside is arrayed with new leaves and covered with flowers, this house would be pronounced beautiful; but when the perfection of this eternal spring contrasts with the snow outside and with the dull chills of wintry blasts, the transition from winter to summer, on passing the threshold of this fernery, is most bewildering and enchanting. What horticulturist, therefore, would ever be without a fernery? In former years I have had every English fern growing at Finsbury Circus, in the centre of London; therefore it must not be imagined that it is necessary to go into the country for the purpose of having an indoor fernery with all its concomitant graceful forms.

In indoor ferneries it is necessary to have at all times a moister atmosphere than that which exists in orchard-houses or greenhouses. I never grow ferns without open tanks of water, and troughs are placed on the hot-water pipes. In my fernery I have also a miniature river

running through the house and expanding into a little lake, so that an ample supply of aqueous vapour is supplied to the atmosphere.

Although a moist atmosphere is requisite for the growth of ferns, a constantly wet atmosphere is not to be commended, for after ferns have made their growth they are improved by having more air, more light, and a drier air to ripen the fronds. It is desirable to give ferns a thorough rest in November and December, when the weather is dark, by lowering the temperature, by diminishing the aqueous vapour in the atmosphere, and by lessening the supply of water to the roots.

The ferns which we cultivate in our ferneries, taking them in the order described in the valuable manual of Sir W. J. Hooker and Mr. Baker, illustrate many species and a considerable number of genera. Perhaps this valuable and learned contribution to botanical science would be more convenient, were the genera further divided.

We have grown Gleichenias, but the atmosphere of my house has proved too close for them, as they require plenty of light and air. They are very elegant ferns, and attain a large size. We have also grown the *G. Speluncæ*, the *G. microphylla*, and the *G. flabellata*. They are difficult to propagate, as they do not bear interference with the root, and are consequently rather expensive to purchase.

The great family of Polypodiaceæ supplies us with many species. Of the Cyatheas, we have had the *C. arborea*, a noble tree fern from Jamaica, but my fernery proved too cold, and it died. Wonderful specimens of this fern exist at Kew. The next beautiful tree fern, the *C. dealbata* from New Zealand, is almost hardy, and delights to be out of doors in summer. It is an exquisite fern, and is the most desirable of all the tree ferns, as the silvery colour on the under side of the fronds is particularly beautiful. The finest specimen I have seen is at Backhouse's, in York, but other large plants are occasionally imported. The *C. medullaris* (fig. 888) is another noble fern, from the Pacific Islands, with fronds from ten to fifteen feet long. Seedlings of this fern attain a large size, and, as I have before mentioned, we can sit under one plant of this species which was taken to the garden a few years ago in my pocket. The *Cyathea princeps*, from Mexico,

is a lovely fern, but it has to be grown in the warmer part of the house The *C. Schiedei* (fig. 889) is a very graceful fern; the under surface of the fronds is of a lovely silvery lustre: it is a desirable acquisition

FIG. 888.—Cyathea medullaris.

FIG. 889.—C. Schiedei.

The genus Alsophila yields us two species, the *A. australis* (fig. 890) and *A. capense*, both of which do well in the outdoor ferneries in summer time. The *Onoclea sensibilis* and *Struthiopteris germanica* (fig. 887) we have excluded from the house altogether, as they grow so much better out of doors.

The *Dicksonia antarctica* is a noble tree fern, nearly but not quite hardy. It grows rapidly from spores, and in a few years makes

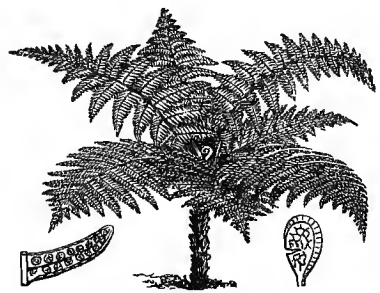


FIG. 890.—Alsophila australis.

FIG. 891.—Dicksonia squarrosa.

a good trunk. Dr. Hooker pointed out to me the advisability of not removing the dead fronds, but of allowing them to fall pendant over the trunk, which gives a peculiar and picturesque appearance to the whole plant. We grow also plants of the *D. squarrosa* (fig. 891). Some species of Dicksonias are called by Kaulf *Cibotium*, and of

these we grow *D. Barometz* (fig. 892), from Assam, which is also called the Tartarian Lamb; this forms fine fronds, and is a splendid fern. A fraud was practised by taking the caudex of this fern and cutting away all the fronds but four, which were also cut a short distance from their point of juncture with the caudex. When this was turned up, its shape resembled that of a lamb. It was then reported to be a half vegetal and half animal production, which ate grass. It is well pictured in Evelyn's "Sylva," and specimens of the "lamb" exist in the British Museum, from one of which my illustration (fig. 893) is taken. We have also *D. fibrosa*, which is considered to be a variety of *D. antarctica*.

FIG. 892.—Dicksonia Barometz.

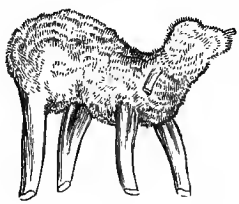


FIG. 893.—Tartarian Lamb.

We have attempted the culture of some of the Filmy ferns, but only to a moderate extent, from the great difficulty of procuring specimens. They require for their culture shade from the sun, ample light, and a moist atmosphere, and they will not bear any change in the hygrometric state of the atmosphere. The temperature they require depends on the country from which they come, but all which require artificial heat ought to be covered with glass to ensure the equal hygrometric state of the air. The *Hymenophyllum demissum* (fig. 861), from New Zealand, is perhaps the most readily cultivated, especially if covered with a bell-glass. We have also the *H. javanicum* under the names of *H. flexuosum* and *H. crispatum; H. ciliatum* from tropical America; and also *H. asplenioides*, likewise from tropical America.

We grow two English Hymenophyllums, *H. Tunbridgense* (fig. 863)

and *H. Wilsoni*, in the fernery under the protection of glass. Mr. Backhouse, of York, has one of the finest collections of filmy ferns, and is most successful in their culture; his plants are so fine that they are worth a journey to York to see. He grows many of them in a cave lighted from the top with glass. At Kew there is a splendid collection; and the Rev. A. Johnson and Mr. Cooper Forster are also cultivators of these truly fairy-like beauties in London itself.

FIG. 894.—Trichomanes Luschnatianum.

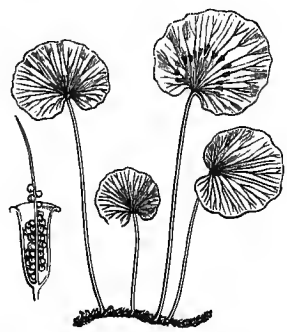


FIG. 895.—T. reniforme.

FIG. 896.—Hypolepis repens.

Like the Hymenophyllum in the transparent character of the membrane of the leaf, and requiring similar cultivation, we grow the *Trichomanes speciosum* (fig. 864), or Irish Bristle Fern, in the glass fernery. It has been recently found in Wales, but I am assured that the spot has been rifled. I have likewise a plant of the *T. Luschnatianum* (fig. 894), from the Organ mountains of Brazil, given to me by Mr. Backhouse, who grows this fern, climbing on earthen tubes, in the highest perfection. This beautiful fern is considered by Dr. Hooker to be a variety of *T. radicans*. I also grow the *T. pyxidiferum*, from South America. We have tried unsuccessfully the beautiful *T. reniforme* (fig. 895), from New Zealand, probably from not having a sufficiently strong plant with which to commence. These filmy ferns are expensive to purchase and very difficult to grow; nevertheless their exquisite beauty, which surpasses that of all other ferns, renders

them most desirable plants to cultivate, and a horticulturist might make himself very happy with a collection of these alone.

The genus Hypolepis affords us the grand *H. repens* (fig. 896), from tropical America. It grows very freely, and the spores come up all over the house, and therefore have to be exterminated, or in a short time we should have a hypolepis-house instead of a general fernery. We have also *H. tenuifolium*, from Java, and *H. distans*, from New Zealand.

We have many Cheilanthes. They like air and light. We grow *C. lanuginosa*, from Illinois; the *C. lendigera*, from Mexico, and the *C. argentea*, from Japan; *C. spectabilis;* and *C. elegans* (fig. 897), which is a beautiful fern. Our specimens of *Onychium japonicum* (fig. 897*a*) grow more satisfactorily in a greenhouse, or in the outdoor ferneries,

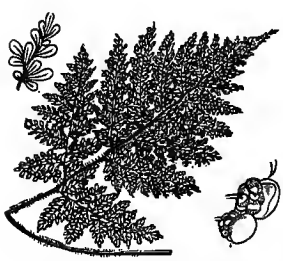


FIG. 897.—Cheilanthes elegans.

FIG. 897*a*.—Onychium japonicum.

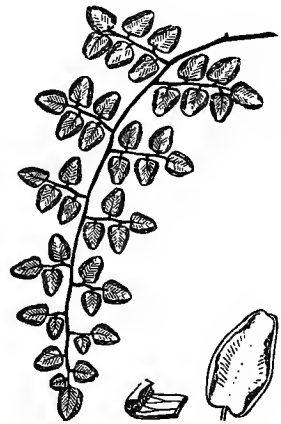


FIG. 898.—Platyloma flexuosa.

as also do those of the Parsley Fern (*Cryptogramma crispa*). The *Pellæa rotundifolia*, called by Smith the *Platyloma rotundifolia*, forms more healthy fronds out of doors, but does not appear to stand the severest winters. The *Pellæa* or *Platyloma flexuosa* (fig. 898) has fronds of a very peculiar green, and is a beautiful species to hang in a basket, with its fronds drooping down.

The genus Pteris contains a large number of species, from all parts of the world, of which we have many examples. *Pteris cretica*, from Italy, survives many winters in this climate, as also does that pretty

but common fern from China, *P. serrulata*, which stands the winter at my garden. Although one of the commonest of all ferns, and so easily multiplied by spores, it is beautiful, and is useful for decoration, or to fill up gaps. There are crested varieties of this species, which are pretty. *P. tremula* is a large fern from Australia, which thrives well out of doors in summer, and is easily propagated. *P. aquilina*, which grows all over the world, will live in the fernery as well as outside; if it were scarce, it would be esteemed a beautiful fern. The *P. scaberula*, from New Zealand, is a lovely one when finely grown; it likes to be out of doors during the summer.

The *P. argyræa*, with a band of white over the frond, and *P. tricolor* (fig. 899)—varieties, according to Hooker, of *P. quadriaurita*—are very desirable and beautiful, and are easily grown. The *P. vespertilionis*, also called *P. incisa* or *Litobrochia vespertilionis*, is a very elegant fern, which attains a large size, and will flourish out of doors during the summer. *P. longifolia* is a distinct fine fern with fronds three feet long. *P. umbrosa* is a magnificent fern from Australia. The colour of the fronds is fine, and it is grand in appearance. The fertile fronds are four feet high, and are more slender than the barren, which are about two feet high. The *P. palmata*, or *Doryopteris nobilis*, from tropical America, is a fine bold fern, but is apt to die off if it does not have careful treatment. The *P. sagittifolia*, from Rio Janeiro, is another curious plant.

FIG. 899.– Pteris tricolor.

The Davallias are a beautiful genus of ferns, of which we grow many species. Of these *D. canariensis* is said to have been cultivated for upwards of a century and a half. It will not bear our winters out of doors, but likes plenty of light and air, and even some sun. The *D. Novæ Zelandiæ* is another beautiful species, which barely lives out of doors, but delights in air and full exposure in the summer months. *D. pyxidata* is a stiff-fronded species, from Australia. Some of the

Davallias—such as *D. bullata* (fig. 900), *D. dissecta*, *D. Lindleyi*, *D. pentaphylla*, *P. tenuifolia*—are exquisite when planted in baskets, and suspended from the roof. *D. alpina* is also a small, interesting species.

No Cystopteris is grown in the fern-house, although four species are grown in the open-air ferneries: namely, *C. fragilis*, an English species; *C. alpina*, from Scotland; *C. bulbifera* (fig. 883), from North America; and *C. montana* (fig. 869), from Scotland.

One Lindsæa is grown with us, the *L. cultrata* (fig. 900*a*), from the north of India.

The genus Adiantum has numerous species, some of which are among the loveliest ornaments of the fern-house. Many species adorn my fernery. *A. reniforme* (fig. 901), from Madeira, is a little difficult to grow; it probably requires more air and less moisture: its kidney-shaped leaves are remarkable. *A. trapeziforme*, from tropical America,

FIG. 900.—Davallia bullata.

FIG. 900*a*.—Lindsæa cultrata.

FIG. 901.—Adiantum reniforme.

has fine large fronds; it requires the warmest end of the house: this is a fine fern, and cannot be dispensed with. *A. cultratum* is a desirable variety: when the new fronds unfold, the edges are red. *A. pentadactylon* is another desirable variety of this fern. *A. intermedium*, from tropical America, is also grown. *A. formosum*, from Australia and New Zealand, is a bold-looking fern, and looks well as a large plant; it is a fine and common fern for a greenhouse. *A. macrophyllum*, from Mexico, has its fronds, when in the growing state, beautifully coloured with red. *A. Capillus-Veneris*, although distributed all over the world, must never be excluded from a fernery. *A. concinnum* is another rather common

fern of great beauty, and should always be grown. *A. tenerum* is remarkable in giving to us a garden variety, which is perhaps the most beautiful of all ferns, called *A. Farleyense* (fig. 902). Spores of *A. Farleyense* do not reproduce the same plant, and it does not thrive well when divided. Mr. Smith, the Curator of Kew, recommended me to grow it in strong loam, but I have only one small plant, the merest shadow of the glorious specimens which exist at Kew and at Messrs. Veitch's nursery.

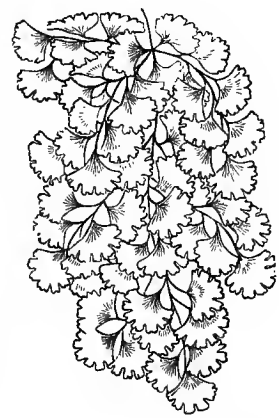


FIG. 902.—Adiantum Farleyense.

The *A. cuneatum* (fig. 903) is a fern which we grow, and which is much used for table decoration. It is a general favourite, and though a native of Brazil, with me is as hardy as the *A. Capillus-Veneris* (fig. 862), if not more so. The *A. fulvum* (fig. 904), as it unfolds its young fronds, which are of a scarlet colour, is interesting, and it is easily propagated from spores. *A. Feei* is an interesting variety, and is a very distinct form of this genus; we have a large plant of this species, which thrives

FIG. 903.—A. cuneatum.

FIG. 904.—A. fulvum.

exceedingly well with me. The *A. pedatum* does not thrive so well in the house as in the outdoor alpineries, where it is a splendid fern. *A. tinctum* is delicate and beautiful in spring. *A. lucidum*, from the West India Islands, is a desirable one, having fine fronds from nine to fifteen inches long. *A. curvatum* is also a fine fern, which does well in my fernery, but does not grow readily in all situations.

Some of the Lomarias grow outside, and some in the indoor fernery The *L. gibba* (fig. 905) is a beautiful miniature tree fern, highly ornamental, but subject to thrip. It is a native of New Caledonia therefore only requires moderate heat, and should be grown in every fernery. *L. attenuata* is a handsome fern ; its rhizome may be made to take the form of a tree fern, like *L. gibba*. *L. Banksii*, from New

FIG. 905.—Lomaria gibba.

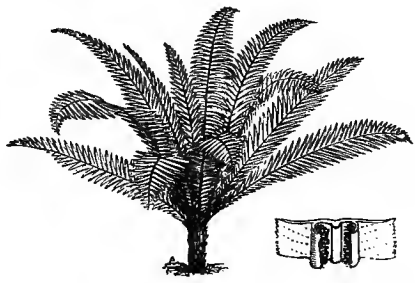


FIG. 906.—Blechnum orientale.

Zealand, is a pretty miniature fern. *L. Patersoni* is a remarkable fern, the fertile fronds of which are thin, and the barren ones broader. *L. gigantea* is a distinct species from America. The *L. spicant*, *L minor*, and *L. alpina* are grown out of doors.

The Blechnums are noble ferns, mostly of considerable size. *B brasiliense*, also called *B. corcovadense*, easily grows from spores, and is a fine fern. *B. occidentale*, from America, and *B. orientale* (fig. 906),

FIG. 907.—Woodwardia radicans.

FIG. 908.—Doodia aspera

from Australia, are noble ferns, and easily grown. *B. nitidum*, var. *contractum*, is a fine fern. All the Blechnums have a red tint in their young fronds.

Another genus, the Woodwardia, is distinguished by two splendid species, *Woodwardia radicans* (fig. 907), from Madeira, which forms

little plants on the fronds, and *W. orientalis*, from Japan, which has also numerous little plants on the fronds. Both live with me out of doors, but the best plan is to place them out in summer only. The *W. radicans* forms splendid fronds many feet in length.

We have the *Doodia aspera* (fig. 908), from Australia, which grows like a small tree fern in the outdoor fernery, indoor fernery, and in Ward's cases in my dining-room. The new fronds have a pink tinge, and among hard-leaved ferns this variety is one of the more graceful. The *D. caudata*, from Australia, is not important; it will live both in the glass fernery and in the outdoor ferneries.

No less than 280 species of Aspleniums are described by systematic writers; of these we have a selection which thrive out of doors, and a further selection for the indoor fernery. The English species—*A. Adiantum-nigrum*, *A. trichomanes*, *A. viride*, *A. fontanum*, *A. Ruta-muraria*, *A. septentrionale*, *A. germanicum*—grow out of doors, but not *A. marinum*, which, curiously enough, does not object to a stove heat, nor *A. fontanum*, nor *A. lanceolatum*, which like a greenhouse temperature. The *A. Filix-fœmina* (fig. 877), with its century of varieties, ornaments our banks, glens, and glades, but in the house is apt to get thrip. The *A. fragrans*, a variety of *A. australasicum*, is rather difficult to grow. The *A. flabellifolium*, from Australia, is a charming species, having little plants at the ends of its long fronds; I have had it for many successive years in my dining-room. *A. viviparum* looks like parsley, and has numerous young plants at the tip of the leaves. One of the species has very curious scales, which are truly lovely microscopic objects, one of which Mr. Smith has figured from a plant growing in my drawing-room (fig. 909): the little scales are shown on the leaf, and also magnified twenty times. *A. canariense*, a variety of *A. præmorsum*, is a nice fern. We have *A. nitidum*; and *A. laceratum* is of an elegant form. *A. caudatum*, from Australia, is a very beautiful fern, with fronds about eighteen inches long; it grows well when planted in the house. *A. Belangeri* is a

FIG. 909.—Asplenium, with characteristic scales. (Scales × 20 diam.).

handsome fern from the Malay Archipelago. *A. macilentum*, a variety of *A. auritum*, is prettily veined. *A. attenuatum* is a fine stiff fern from Queensland, and forms a handsome plant; whilst *A. formosum* is a very graceful one. So is also *A. flabellatum*, a variety of *A. rhizophorum*, from tropical America.

The fronds of *A. macrophyllum* are very dissimilar from those of any species hitherto described; the plant hardly looks like a fern, and is valuable on account of that dissimilarity, for the sake of contrast *A. falcatum* is a graceful fern from Japan, which does better out of doors than in the house. *A. dispersum* is a very desirable basket fern, from tropical America, with fronds not exceeding nine inches in length.

A. Serra is a firm, erect, and fine species from tropical America. *A. nidus*, var. *australasicum*, or Bird's-nest Fern (fig. 910), is a fine species with large fleshy fronds arranged round a centre; it may be placed out in summer. *A. bulbiferum* is a common fern, from New Zealand, which likes outdoor treatment in summer.

FIG. 910.—Bird's-nest Fern.

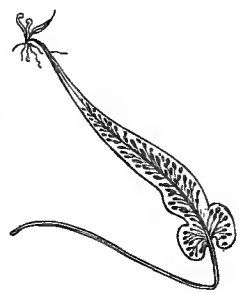


FIG. 910*a*.—Camptosorus rhizophyllus.

FIG. 911.—Actiniopteris radiata.

The Scale Fern, *A. Ceterach*—or, as it is commonly called, *Ceterach officinarum* (fig. 868)—does not grow well in the house, but does perfectly well in the open ferneries, as has been already described.

There is a remarkable species, and the only one of a genus called Actiniopteris, which exactly resembles a miniature palm-tree; this is the *Actiniopteris radiata* (fig. 911), a native of India. I have a single plant, and have been told that it likes plenty of light, and drought at certain seasons of the year, when it is at rest.

The Scolopendrium of our English woods (fig. 867), with its curious sports, varieties, and deformities, is a magnificent fern, which thrives better out of doors than in the outdoor fernery. Another species, S. *rhizophyllum* (fig. 910*a*)—or, as it is sometimes called, the *Camptosorus rhizophyllus*, or Walking Leaf—is an interesting fern from British America, which forms a new plant at the end of the frond.

FIG. 912.—Didymochlæna lunulata.

The indoor fernery contains a fine fern called the *Didymochlæna lunulata* (fig. 912), from tropical America, which has metallic-looking fronds. The plant has the curious property, when not in health, of dropping its pinnules, which gives it a woe-begone look.

The genus Aspidium yields us the noble *A. aculeatum*, which grows all over the world. There are many varieties, of which *A. proliferum*, from Australia, is a most elegant fern, and will grow either out of doors or in the fernery; it is frequently called *Polystichum angulare* (fig. 873). The *A. Lonchitis*, or Holly Fern (fig. 874), from the Highland mountains, is a beautiful fern for greenhouses or for outdoor ferneries. The *A. falcatum*, generally called *Cyrtomium falcatum*, is a useful greenhouse fern, but hardly succeeds out of doors.

The *Aspidium coriaceum*, or *Polypodium capense*, as it is sometimes called, is a fine hard fern with fronds from one to three feet long.

The genus Nephrodium, in which Hooker and Baker comprise all the Lastreæ, is another very large genus, which affords us many important species. The *N. Sieboldii*, from Japan, is a fine fern, nearly hardy if not quite. The *N. patens* is another fine fern, which readily multiplies itself. This genus also gives to us the beautiful *N. Thelypteris* (fig. 876), the *N. Oreopteris*, called by Baker *montanum*, and the noble Male Fern, or *N. Filix-mas* (fig. 875), which has an extensive geographical distribution, and presents many varieties; also the *N. cristatum*, the *N. spinulosum*, with its varieties, and especially *N. dilatatum*, or Broad Fern, and the *N. æmulum*, the Hay-scented or

Bree's Fern, all of which are grown in the outdoor fernery. The *N. molle* (fig. 913) is very common in ferneries, and may be used in places where more esteemed plants will not grow. *N. sanctum* is a slender, tufted, and most elegant fern, from the West Indies.

The *Oleandra articulata* (fig. 914), from the East Indies, is rather a favourite with me.

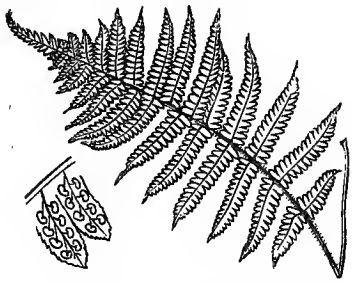


FIG. 913.—Nephrodium molle.

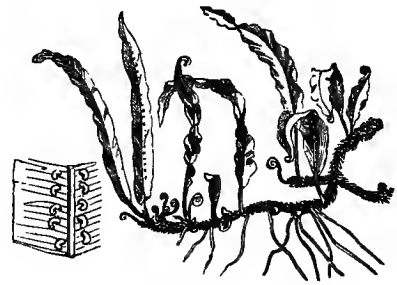


FIG. 914.—Oleandra articulata.

Hooker and Baker have combined various genera into one large genus, Polypodium, under which they have described 389 species which have sori on the back of the fronds, which produce a fine effect. The *P. Phegopteris*, or Beech Fern, grows better in the greenhouse or in the open air than in the outdoor fernery. The *P. hexagonopterum*, from Canada, does well in the outdoor ferneries, as does the Oak Fern (*P. Dryopteris*); *P. calcareum*, or *Robertianum*, which flourishes in the orchard-house, is considered to be a variety of this. The *P. alpestre*, and its variety *P. flexile*, is like the lady-fern; and the beautiful *P. vulgare*, which grows so abundantly over the country, delights us with the golden sori at the back of its fronds (fig. 870). *P. Plumula* is a graceful fern. *P. squarrosum* is a small fern, with creeping rhizome and fronds two or three inches long. The *P. verrucosum* (fig. 915), from the Philippine Islands is another beautiful species. The *P. appendiculatum*, with fronds about two feet long, which when young are much tinged with red, is very beautiful; it is a native of the Eastern Himalayas. The *P. lycopodioides*,

FIG. 915.—Polypodium verrucosum.

called also *Phymatodes lycopodioides*, is a good basket fern, as is also the *P. liniatum*. The *Polypodium* or *Goniopholebium squamatum*, from the West Indies, is another good fern to suspend in a basket. The *Polypodium* or *Goniopholebium subauriculatum*, with the fronds hanging down from baskets, is very graceful; it comes from the Malaccas The *P. Reinwardtii* is another basket fern, with fronds from two to three feet long. The *P. refractum* is a fine fern, with light transparent fronds from one to two feet in length. The *P. lonceum*, from Mexico, has fronds from twelve to eighteen inches in length. The *P. Fortunei*, from China, has barren fronds from two to three inches, and fertile fronds from twelve to eighteen inches long.

The *P. adnascens*, from India, is a distinct fern. It has both barren and fertile fronds; the fertile fronds are from six to twelve inches long. The *P. Gheisbreghtii*, from South Mexico, has a very distinct and remarkable character, and is hardly like a fern in appearance. *P. repens* is another fern from Mexico. *P. persicæfolium* is a fine basket fern, with fronds three feet long. *P. stigmaticum* is a small fern from Columbia, with fronds about three feet long.

The *P. filipes* (fig. 916) is a small and pretty species, which lives on the trunks of tree ferns, or creeps up the trunks of trees. *P. Heracleum* is a noble fern from Java and the Philippine Islands. *P. piloselloides* is a very small and distinct species, which grows in a pan, and is an interesting fern from the Himalayas. *P. musæfolium* is exquisite in the nervation of its fronds, which are from one to three feet long. It is a native of the Malay Islands, and when well grown is really a magnificent fern; however, it is apt to die off if not grown with care. It should have abundance of light, and the peat soil should be occasionally changed.

FIG. 916.—Polypodium filipes.

The Nothoclæna are a pretty genus of ferns, having fronds mostly small, and generally not exceeding a foot in length. The *N. nivea* is a very beautiful species from the Andes, which has the fronds completely covered with white powder.

In the Silver and Gold ferns we have a group of lovely plants, belonging to the Gymnogrammæ. One species is so far British that it grows in Jersey. I have seen plenty on the shores of the Mediterranean, but have not been successful with, and do not now possess, the plant. The *G. calomelamos*, with white powder, is a fine species; and its variety *G. chrysophylla*, with golden powder (fig. 917), should always be grown. In winter time these beautiful ferns from the West Indies require but little water, and should be placed near the light. I have large plants of these ferns which are of surpassing beauty. Seedlings come up freely, but vary in excellence.

FIG. 917.—Gymnogramma chrysophylla.

FIG. 918.—Meniscium simplex.

The genus Meniscium embraces but few species, of which we have one, *M. simplex* (fig. 918), which we grow in a basket. It is a native of China.

FIG. 919.—Acrostichum crinitum.

FIG. 920.—Platycerium alcicorne.

FIG. 920*a*.—Platycerium grande.

The genus Acrostichum is an important one. The *A. crinitum* (fig. 919), from the West Indies, is a very interesting and remarkable plant, affording quite a contrast to delicate and graceful ferns: the

fronds are covered with hairs. The *A. quercifolium* is another most interesting plant, with a frond like an oak-leaf.

The Stag-horn ferns, or Platyceriums, constitute a remarkable genus, and help to diversify the aspect of a fernery. The *P. alcicorne* (fig. 920) is common, and will grow out of doors in the summer time, as it comes from Australia. It likes light and air. When planted in a suspended basket, young plants are formed at the apices of the roots so that an immense aggregation of plants is the result. *P. grande* (fig. 920*a*) is a magnificent plant from Australia; it has become somewhat scarce, but I do not know the reason. A fine specimen is a splendid object. It multiplies from spores, and I have seen seedlings at the Botanic Gardens at Florence, and I myself possess one obtained from a nursery. I have besides the *P. æthiopicum*, from the coast of Guinea. In all the Platyceriums (and there are but five species known), the barren fronds differ from the fertile, which resemble stag-horns. They are all fine, interesting, and striking plants.

Another small genus, Osmunda, has only six species, of which we grow three: one of them is *O. regalis*, with its diminutive from America, *O. gracilis* (fig. 881); the other two are *O. Claytoniana*, also called *O. interrupta* (fig. 882), and *O. cinnamomea*, both from Canada. We prefer to grow all out of doors, though *O. cinnamomea* and *O. Claytoniana* are finer when grown in a cold house.

The Todea is another genus, containing only four species, but these are of matchless beauty. *T. barbara*, or *africana*, as it is called by some, from New Zealand, has a caudex of great size. There is a plant of this species at the temperate house at Kew which weighs some hundredweights, and there is also one of large size at the Botanic Gardens at Florence. My younger plants form finer fronds than even these large and interesting plants.

The three other species, sometimes called Leptopteris, have filmy membranous fronds. The *T. hymenophylloides* is a lovely fern, which when old has a stem like a tree fern, from the top of which the fronds spring forth in the most elegant manner. This fern is liable to be attacked by fungi, and likes air and light, and even this forms its caudex

very slowly. The *T. superba* (fig. 921) is a splendid fern, which was discovered by Captain Cook in New Zealand. It is also liable to be attacked by a parasitic fungus. I have both these last-mentioned todeas out of doors, under glass in my drawing-room, and also in my fernery. The *T. Fraseri*, the last species, is still a desideratum with me. An illustration of a sporangia of a todea is annexed.

FIG. 921.—Todea superba.

FIG. 922.—Sporangia of Todea.

There is one genus of ferns (Lygodium) the members of which are climbers, and hence afford a remarkable contrast in habit to the others. The *L. palmatum* (fig. 922*a*), from America, is a fine climbing species, which lives out of doors in my garden. The *L. scandens* (fig. 923), from South China, is another climbing species, which covers posts, and is very graceful and elegant. We have also *L. volubile*, from Cuba.

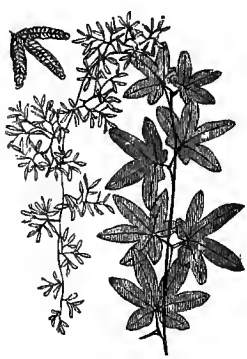


FIG. 922*a*.—Lygodium palmatum.

FIG. 923.—Lygodium scandens.

FIG. 924.—Anemia fraxinifolia.

The Anemias, or Flowering ferns, are a very distinct genus, but are perhaps more curious than beautiful, and do not produce much effect in a house. The *A. fraxinifolia* (fig. 924) shows the character of this genus.

We have a small plant of the gigantic *Angiopteris evecta* (fig. 925), from India, Japan, and Ceylon, which when in perfection has fronds

fifteen feet long. We have also a single small plant of *Marattia laxa* (fig. 926), from the coast of Guinea, which is another gigantic ern, having stiff fronds of similar magnitude.

FIG. 925.—Angiopteris evecta.

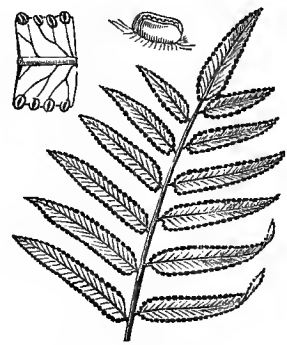


FIG. 926.—Marattia laxa.

Of the family of Ophioglossaceæ we have only the *Ophioglossum vulgatum* (fig. 880), which grows freely out of doors, but not in the house ; and of the genus Botrychium we have *B. simplex*, from North America, and *B. Lunaria* (fig. 879), a native of England.

The great botanist Linnæus was only acquainted with 180 species of ferns, so that more than twice as many are growing in my garden than he had knowledge of.

In the cultivation of ferns, it is of primary importance that they should never be allowed to become dry, and yet they ought not to be unduly sodden with water at the roots, and I find that many of my species have been lost from want of proper care. Almost all other plants except ferns bear a drying, scorching sun, which renders the leaves flabby in the daytime, but the damp of the midnight dews restores them ; nevertheless ferns require a uniform and constant moisture. There is, however, no rule without an exception, for, as I have before stated, I have seen ceterach growing in Italy on the dry Apennines, when the fronds seemed as if they were half baked, and yet the plant survived and flourished.

As a general rule in the treatment of ferns, they like decomposing but not rotten vegetal matter, moisture to the roots but not a soddened soil, an atmosphere full of moisture but not water to the fronds, light

without the burning rays of the sun, and fresh air but without draught. Under these conditions they will attain to their highest perfection.

Ferns are propagated by division of the roots, from bulbs on the leaves, and from spores. The method of raising ferns from spores is very peculiar, and must be rightly practised to be successful. The fronds of a fern—say of a lady-fern—are taken when the spores fall spontaneously and freely, and those fronds should be selected which have grown freely in the light and air in a warm place. The spores are scattered over moist peat, interspersed with little pieces of broken brick and sandstone, and the pan is then covered with glass and kept in a shady place till the spores commence to grow. When a spore germinates, a filmy membrane appears, called a *prothallus* (fig. 927), and resembling Marchantia (fig. 824) in appearance. This sends down roots into the ground; but besides forms two bodies, one the nidus of the future plant, and another containing active bodies, which come in contact with the nidus and fertilize it. The bud, after having been fertilized, throws up little leaves, and becomes a miniature plant, and the prothallus disappears. It has been recommended, in order to destroy all living organic matter, that the peat should be immersed in boiling water before sowing the spores. No seedling has appeared out of doors in my garden.

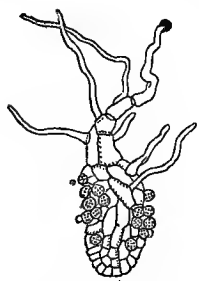


FIG. 927.—Prothallus.

LYCOPODS, OR CLUB MOSSES.

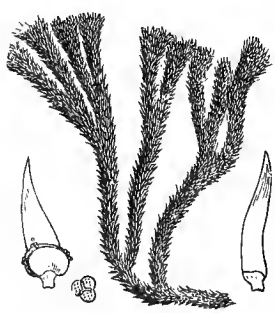


FIG. 928.—Lycopodium Selago.

I have often planted the Club Mosses, which are such interesting plants in mountainous districts. I have had the *Lycopodium clavatum* in quantity, but it never grew. On the Welsh mountains this plant grows to a length of many yards, and is a remarkable sight. The *L. Selago* (fig. 928) and another species are now growing in my mossery.

MARSILEAS.

I have had two species of Marsileas in my fernery,—*M. quadrifolia*, a South European plant, and *M. macropus*, the Nardoo plant (fig. 929) of the Australian explorers. Both require to be grown in a pan of water, and flourish well during the summer, but there is some difficulty in keeping them during the winter.

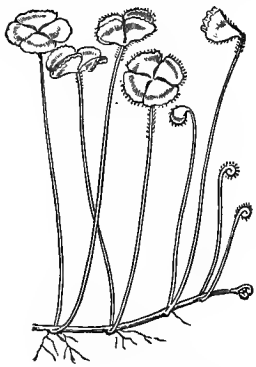


FIG. 929.—Nardoo plant.

FIG. 930.—Selaginella denticulata.

FIG. 931.—S. Lyallii.

SELAGINELLAS.

No fern-house can possibly be considered perfect without Selaginellas. I have gathered the common *S. denticulata* (fig. 930) on both sides of the Alps, and it lives through the hardest winters in my outdoor fernery.

It affords us green foliage where we desire it, and is most easy of cultivation, as it roots from the shoots as it grows. The *S. brasiliensis* is a much smaller species, and *S. apoda* is a very dense-growing one. The *S. cæsia* is a most lovely species, from China, but it dies down in winter: its colour is a fine bluish green. Another climbing species, *S. cæsia arborea*, which is of more robust habit, is also exquisitely beautiful when well grown. It also is apt to die in winter time. The *S. serpens* is remarkable from changing the tint of its colour. *S. Schottii* is a coarse-growing species, but *S. stolonifera* is a beautiful one, especially its white variety, and *S. umbrosa* and *S. densa* are thicker-growing species. *S. Lyallii* (fig. 931) is a desirable plant

to cultivate. I have tried *S. Willdenovii* out of doors, but though it survived some years it ultimately perished. Lastly, *S. circinalis* is interesting, as being imported in a dry state from America, under the name of the Resurrection plant; it uncurls when moistened, but as far as my experience goes does not come to life again. All these plants grow in peat earth, and most of them are readily propagated by division.

HORSE-TAILS.

The Equisetums, or Horse-tails, are an interesting class of plants, as they contain so much silex as to be capable of being used for polishing. Our ground is remarkably free from these plants, and we only find a few specimens of *E. arvense*. I have tried to introduce *E. sylvaticum* (fig. 932) into my ferneries, but without success. It is a very graceful plant, and grows in woods, in places where the oak and beech ferns luxuriate. When an opportunity occurs, I shall again endeavour to introduce it.

FIG. 932.—Equisetum sylvaticum.

The delicate beauty of ferns and their allies is always enchanting, but my available space does not permit me to describe all the beauties my garden presents to view, nor all the various forms of each fern which gladden the eyes of those who are capable of appreciating their loveliness.

> "For certes at my devise,
> There is no place in Paradise
> So good in for to dwell, or be,
> As in that garden, thoughte me."—CHAUCER.

Vign. XXIII.—Scene on the Wandle.

CHAPTER XII.

MY FOREST TREES.

"Par ses fruits, par ses fleurs, par son beau vêtement,
L'arbre est de nos jardins le plus bel ornement :
Pour mieux plaire à nos yeux combien il prend des formes !"

DELILLE, *Les Jardins.*

ALTHOUGH my garden does not contain extraordinary specimens of forest trees, yet in the district around us trees grow of a magnitude and beauty almost unrivalled in Europe. First and foremost, there are gigantic English Elms of many centuries' growth, in the upper branches of which rooks delight to build, and under their shade the cattle protect themselves from the mid-day sun. In the adjacent grounds of Wallington House a group of noble trees adorns the landscape, which I never can view without delight; and on returning from a tour on the Continent it is always a subject of remark with me, that I have met with scarcely any trees of equal size, and the contrast between them and the comparative pigmies I have observed abroad is very striking.

"There were elmes great and strong."—CHAUCER.

The roots of elm-trees run near the surface for long distances, and not only exhaust the soil, but send up shoots to form other trees. I prevent them from encroaching upon my croquet-ground and flower-borders by periodically digging a trench about three feet deep, and cross-cutting every root running in an unsuitable direction.

There are many varieties of Elm, but the one cultivated about Wallington is chiefly, if not entirely, the true English elm (fig. 933). At some former period the elm appears to have been the favourite tree. It is not much planted at the present time round London, as of late years it has extensively died, and in our London parks has been replaced by the plane-tree. The Weeping Elm, a variety of the Scotch Elm (*Ulmus montana*) has large leaves and horizontal branches, drooping at their tips, well adapted to shade a seat, for which purpose I have one planted near the entrance to my fernery. The effect which a large Elm has upon the landscape is well seen in the moonlight view (plate 21), where an old tree in Beddington Park is conspicuous.

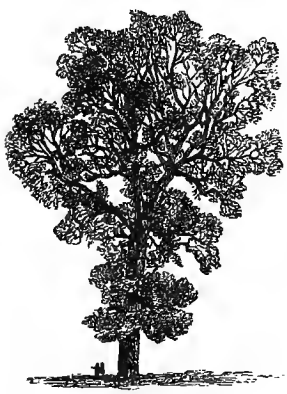


FIG. 933.—Elm.

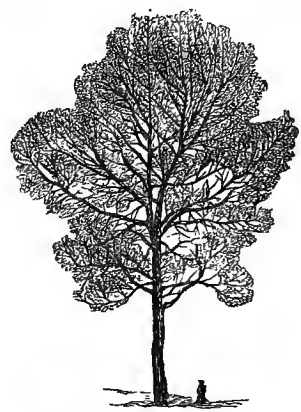


FIG. 934.—Black Italian Poplar.

FIG. 934*a*.—Lombardy Poplar.

Next to the Elm, the Black Italian Poplar (*Populus monilifera*, fig. 934) takes a prominent place. It grows perhaps the most rapidly of all trees, and is a desirable one to shut out unsightly objects. Very tall trees of this species grow on the south side of the river, and these now overshadow the south-west part of my garden. The Black Italian Poplar tree is not a favourite of mine, as the branches are long and straggling; nevertheless, for the special object of rapidly covering buildings, it has no equal, although it is late before it expands its leaves in spring.

A Lombardy poplar or two (*Populus fastigiata*, fig. 934*a*) agreeably varies a landscape. Its branches are upright, and it attains great height

Plate 21.

with but little width. It may be seen in the view of the Mill (plate 14) overtopping the other trees, and it forms a prominent object in plate 16. This latter tree, thirty-two yards in height, has been blown down since the picture was painted from which the plate was engraved. Beautiful as these trees are interspersed amongst others, it is an abuse of their peculiarities to plant them in rows by themselves, as then their stiff, formal, upright growth is unpleasant to the eye. They are readily propagated by cuttings.

On Mitcham Common a tree known by the name of the "Big Tree" is very picturesque. It is the Black Poplar (*Populus nigra*) which flowers later than the Abele, and may be known by the warts on the trunk (fig. 935).

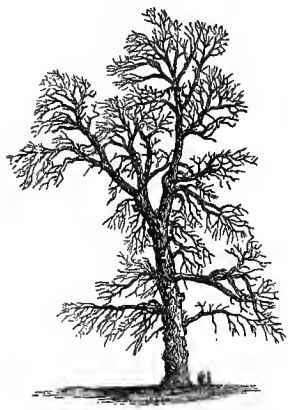


FIG. 935.—Old Black Poplar.

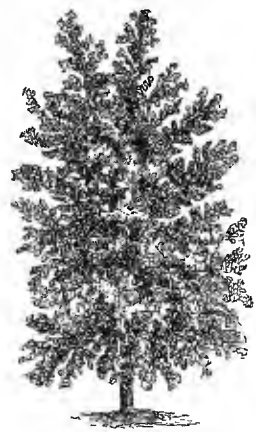


FIG. 935*a*.—Aspen.

FIG. 936.—White Poplar.

The Aspen (*Populus tremula*, fig, 935*a*) is grown more in Scotland than here. It abounds at Loch Katrine, of which Sir W. Scott writes—

> "And variable as the shade
> By the light quivering aspen made."

We have White Poplars (*Populus alba*),—"Populus Alcidæ gratissima" (VIRG. *Bucol.*)—or Abele-trees (fig. 936), near us, which are highly ornamental. The foliage is green on the upper side, but white and downy on the lower, and it is perfectly fascinating when fluttering in a summer's breeze. The white trunk of the tree forms a fine object. A large tree grows a few feet from my garden, but

it has been sadly injured by the cutting ordered by the road surveyor, who about our district forbids any tree to encroach upon the roadway. This tree in early spring produces so much cotton with the seeds that the ground is covered with it, and therefore it does not please tidy gardeners. It is, however, most ornamental, both when growing by itself—when its form is specially beautiful—and when judiciously mixed with other trees. There is a variety called *acerifolia*, of great beauty.

I have a tree or two of the Balsam Poplar (*Populus balsamifera*), which has balsamic, gummy excretions about the buds, exhaling a powerful odour; and also a Weeping Poplar, which is a variety of a species of no great importance, but pretty amongst small trees or shrubs. It is the earliest of all forest trees in coming into leaf.

Our district abounds in noble Horse-chestnut trees (*Æsculus Hippocastanum*, fig. 937). Although the avenue of horse-chestnut trees at Hampton Court is justly esteemed as one of the finest examples of its kind in Europe, yet the full majesty of each tree is rather spoilt by the trees having been crowded together. When a single tree is in flower, it presents one of the most glorious sights of the vegetal kingdom. The tree takes the general form of a gigantic pyramid, and occasionally the branches hang down for many yards, which give it a peculiar and elegant appearance. In spring the tree is covered with blossom, every flower being a pyramid, and every floweret a model of beauty. In Kensington Gardens there are a few trees of surpassing beauty, yet I generally have given the preference to those in Beddington Park. Within the last ten years some of the magnificent trees in the Park have been cut down. Unfortunately, the fruit of this stately tree is unfit for human food. Deer, however, are so fond of it that they will stand on their hind legs to gather it, but for most other animals it is too bitter to be palatable.

FIG. 937.—Horse-chestnut.

I have one or two Red Horse-chestnut trees (*Æsculus rubicunda*), from North America, which are of lower and slower growth than the common horse-chestnut. The red chestnut is one of the most beautiful trees which can be grown on a large lawn. It should stand by itself, and its branches should touch the ground, when the peculiar glossy character of the foliage, contrasting with pink blossoms, renders it highly ornamental. There is a yellow horse-chestnut, which I grow, but it is not particularly beautiful, and may be dispensed with, except when there is ample room, and great variety needed.

The Lime may be seen in the highest perfection in Beddington Park from my garden. It is called the *Tilia europæa* (fig. 938), or Linden-tree, and has been the theme of admiration of German poets. The exquisite forms of some of the Park specimens greatly adorn our landscape. There was once a grand avenue of limes, but many have been destroyed by the builder since he invaded this charming spot. The tracery of the branches of the Lime-tree seen against a clear blue sky in winter is highly elegant, and then I never can look at it without delight. The odour of the flower in summer is delicious. Two fine lime-trees grow in the Bank of England before the windows of the parlour, in the former churchyard of St. Christopher-le-Storks. The mats with which we cover our plants in winter are made in Russia from its inner bark, and gardeners use strips of this bark to tie up their plants. Horace says that he was displeased to see garlands tied with the inner bark of the linden: "Displicent nexæ philyrâ coronæ." Herodotus says: "The Scythian divines take also the leaves of the lime-tree, which, dividing into three parts, they twine round their fingers; they then unbind it, and exercise the art to which they pretend." The aphides which live upon it make so much honeydew, that food is prepared for thousands of bees, wasps,

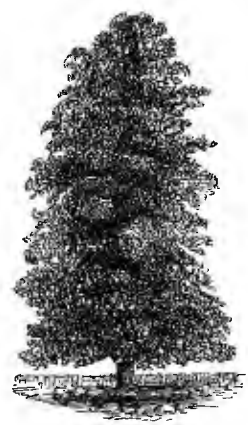


FIG. 938.—Lime.

ants, and other living creatures. We may all say with Landor—"Oh, who upon earth could ever cut down a linden!"

There is a red-stalked variety, also of great beauty. I had a fine young tree, but a former gardener—not imbued with the feeling of Landor—much enraged me by cutting it down for a prop; and when expostulated with, excused himself by saying that he had no idea it was a beautiful tree; proving that eyes are useless without understanding.

We have only one Oak (*Quercus robur*) in the place. Moderate-sized ones exist in the neighbouring field, and smaller picturesque old stumpy trees grow by the river side at Mr. Graham's, close at

FIG. 939.—Last Oak of Birnam Wood.

FIG. 940.—Turkey Oak at Fulham, struck by lightning.

hand. Oaks are not sufficiently numerous in our district to be important, and therefore I have figured the last oak of Birnam Wood (fig. 939).

"Till Birnam Wood shall come to Dunsinane."—*Macbeth.*

I have one or two small Evergreen oaks (*Quercus ilex*), which grow slowly, and for years may be used as tall shrubs. The Rev. Mr. Bridges has a fine specimen in his grounds. I have no Cork-tree (*Quercus Suber*)—which grows well at Fulham—nor do I know of any specimen near at hand. Neither the Fulham oak, nor the Turkey oak with its mossy acorns, nor the beautiful American

oak—with its large leaves, that turn scarlet in the autumn—play any part in the adornment of my landscape.

I have given an illustration of the effect of lightning discharge, which occurred in the spring of 1871, upon a Turkey oak growing in the grounds of Peterborough House, Fulham (fig. 940). The electric current passed down the tree and darted through the air to the iron hurdles, at the base of which it made a hole in the ground. It appeared to have passed through the newly forming wood, or cambium, and in the act of passing from the tree to the earth separated the bark from the tree. The bark is loosened all round, and a piece may be seen lying at the base. I am curious to see how such an extensive injury will affect the vitality of the tree, and I shall watch its career with interest.[1] I have seen the effects of many such electrical discharges on trees, and this may be taken as a fair example of the damage which results. It also teaches us to beware of standing under a tree in a thunderstorm.

A Willow-tree is always associated with rivers and wet places, though persons who cultivate them say the best basket willows will not flourish in very wet soil. There are numerous species,—from the small procumbent one which lives on the tops of the mountains of Scotland, and which we grow in the alpinery, to the great *Salix alba* which lives on the banks of our rivers. Virgil has remarked the effect of situation on various kinds of trees, which well indicates that the truth of an observation of nature, once correctly made, will last from generation to generation :—

> "Nec vero terræ ferre omnes omnia possunt.
> Fluminibus salices, crassisque paludibus alni
> Nascuntur, steriles saxosis montibus orni ;
> Litora myrtetis lætissima ; denique apertos
> Bacchus amat colles, Aquilonem et frigora taxi."
>
> VIRGIL, *Georgics.*

We have several species. The White Willow (*Salix alba*, fig. 941) is the most important, as it forms a forest tree, and is rapid in its growth. In midsummer, when the sun shines, every zephyr turns the leaves, when the silvery whiteness of their under surface contrasts

[1] Sept. 1872 : this tree is now dead.

with the deep green of the pine. In the south of France and in Italy the olive is somewhat similar to the white willow-tree in the colour of the leaves, but the latter tree is more graceful. Any piece stuck in the ground will grow, and hence it is troublesome by taking root where it is not wanted.

The Weeping Willow (*Salix babylonica*) is very elegant, but curiously enough I never had one, nor are there many in the district. Its leaves come out early in spring, and are apt to be injured by frost. There is another weeping willow (American Weeping Willow), which has a finer and darker foliage, and a far more moderate growth, and which is a highly desirable plant to cultivate on lawns. I have some, but they are rather crowded from want of space. To grow this species it must be grafted on a more vigorous stock. We have several other species of the numerous tribe of willows, of which that one which is used in this country instead of palm on the Sunday before Easter is perhaps one of the most interesting: it is the Goat Willow (*Salix caprea*).

FIG. 941.—White Willow.

Herodotus, speaking of the Scythians, says: "They have amongst them a great number who practise the art of divination: for this purpose they use a number of willow twigs, in this manner. They bring large bundles of these together, and having untied them, dispose them one by one on the ground, each bundle at a distance from the rest. This done, they pretend to foretell the future, during which they take up the bundles separately, and tie them again together. This mode of divination is hereditary amongst them."

Sometimes willows are used for hedges, for which purpose the *Salix Kerksii* is recommended by Scaling. This willow is bitter, and game are said not to touch it. Several kinds are grown for basket work, as *S. triandra*, but the varieties of *S. purpurea* are held in the highest repute. The number of varieties appears to be legion, as the Duke

of Bedford grows at Woburn Abbey above 350 different kinds. The propagation of the willow by cuttings, and even of some species by inserting large branches in the ground, is particularly easy.

Another notable river tree is the Alder (*Alnus glutinosa*, fig. 942). It grows in the water, or on the banks beside the water in boggy places; and some writers go so far as to declare that it has a tendency to create a swampy place. We use the alder freely beside the water to hide the buildings of the paper-mill, and in the adjoining park there are some fine single trees of picturesque appearance. We have also very fine specimens of the Cut-leaved Alder.

FIG. 942.—Alder.

The common Ash (*Fraxinus excelsior*) grows so freely in my ground, that it must be considered a weed and a nuisance, as seedlings continually come up where they are not wanted, and, if not removed, grow so rapidly as to stifle the surrounding shrubs. The ash is distinguished by the bold and rugged outline of its branches; it is an imposing tree as we see it in the valleys of Scotland. There is a weeping variety, which is very useful to make an artificial covering. We have one on the croquet-ground, with a seat underneath; and close to Wallington Bridge we have another, which forms a dark bower to protect us from the fierce rays of the sun in the summer months. At the Zoological Gardens of London the weeping ash is judiciously used to protect the visitors at the entrance, and also the animals in the interior of the grounds. It grows rapidly in good soil, but slowly in a dry place, and there requires manure to develop it quickly.

Virgil, contrasting it with other trees, says of the ash:—

> "Fraxinus in silvis pulcherrima, pinus in hortis,
> Populus in fluviis, abies in montibus altis."

One of the greatest ornaments of mountain scenery, the Mountain Ash (*Pyrus Aucuparia*), is of a different genus from the common ash:

it does not thrive very well with me. Its great excellence consists in its hardiness, and in the beauty of the clusters of scarlet berries (fig. 943) with which the tree is covered in autumn. In Scotland it is one of the greatest ornaments of the mountains; but in my garden it has not, up to the present time, been of any importance. Formerly the rowan-tree was an object of superstition. The berries used to be tied round the necks of children to preserve them from witchcraft, when the following couplet was recited:—

FIG. 943.—Mountain Ash.

"Rowan tree and red thread
Drives the witches at their sped."

From inquiries I made in Scotland this year, it appears that this superstition no longer exists, and a forester, in answer to my interrogations, declared that the "schoolmaster had driven it away." A similar superstition exists to this day at Naples, where people of education and position use charms of red coral for a similar purpose.

As we naturally associate the alder and the willow with water, so we connect the Beech (*Fagus sylvatica*) with a dry soil. The manner in which it clothes the hills at Marlow is a good example of its flourishing in a dry chalky soil; and in the neighbouring parish of Carshalton a grove of beeches exists in an equally dry spot. Notwithstanding that the beech loves a dry soil, it grows freely immediately outside my garden, and in a position where the roots of the tree are within a foot or two of the water-line. A grove of beeches is always beautiful, and this tree contributes much to the beauty of the scene around us. The beech-tree is readily propagated by seed. It then grows fast, attains a large size, has a beautiful form, and the glossy green colour of the leaves is very charming. The smooth bark tempts the rustics to carve their names upon it, from the idea that the inscription will enlarge with the growth of the tree. The practice is ancient, as Virgil records that lovers did the same, that their love might grow as the tree grew.

"Tenerisque meos incidere amores
Arboribus; crescent illæ, crescentes amores."

At "The Oaks," in the next parish, formerly the seat of Lord Derby, "J. B. 1778" is clearly visible on an aged beech-tree, cut by the unfortunate General Burgoyne who built part of the house nearly one hundred years ago.

A remarkable variety, the Copper Beech (*F. sylvatica purpurea*, fig. 944), reputed to have been found in a wood in Germany, is a very striking object amongst other trees. One or two may with great advantage be planted. Immediately adjoining my garden, there are two beautiful trees, which I greatly admire. A single purple beech is very handsome, but it does not grow freely in all situations. A very fine single specimen grew so rapidly in the grounds of Mr. Beadnell, at Tottenham, that it kept the air and light from the house, so that he was ultimately compelled to cut it down. Specimens of fine colour are multiplied by inarching.

FIG. 944.—Copper Beech.

FIG. 944*a*.—Pendulous Beech.

FIG. 945.—Birch.

I also have a very singular variety called the Pendulous Beech. It is of a drooping habit; and if a shoot be artificially stretched out at right angles, the branches grow downwards. One such tree in a suitable spot is an object agreeable to the eye. Various specimens of beech exhibit a variation in their habit. Some trees grow with their branches erect, whilst in others they are more or less pendulous.

One of our more hardy trees—which grows well on the driest soils, and yet by no means objects to a wet situation—is the Birch (fig. 945), "the Lady of the Woods." We have them to the south

of my garden, on a bed of sand, and to the north, on a wet, boggy place; but to see this tree in glorious perfection we must go to the Trossachs, or to other parts of the Highlands of Scotland, where its white bark and elegant drooping habit, contrasting with purple heather, dark Scotch pine, and scarlet-berried mountain ash, make a scene of the most charming beauty, in itself amply worth a journey to the Highlands to contemplate. There are two varieties, *Betula alba*, with smooth bark, and *B. alba pendula*, with knotted roughnesses on the stem—growing naturally. There is also another variety, called the Cut-leaf Birch, reputed to be very desirable for cultivation.

"Beorc is beautiful in its branches:
It rustles sweetly in its leafy summit,
Moved to and fro by the breath of heaven."
Anglo-Saxon Poem on the Names of the Runes, by HICKES.

The name of the Mock Plane-tree (*Acer pseudo-platanus*) has been given to the Sycamore, which is unfortunate, as it causes a confusion between the sycamore and the plane trees. It grows freely with me on the border of the lake, but it is a tree not greatly to be admired, especially as it is liable to have its large leaves attacked in autumn by an aphis, when they are subsequently disfigured by large black fungus spots. The celebrated Birnam Wood in Scotland has two of the original trees left,—one a magnificent sycamore (fig. 946).

FIG. 946.—Last Sycamore of Birnam Wood.

The sycamore has the merit of coming into leaf early, and of being easily raised from seed. The sycamore is allied to the sugar maple, and it is said, like that tree, to yield sugar from the sap; but of this I cannot speak from my own experience. There are many other species of maple which I do not grow, but the Japan Variegated Maple and the American Maple, the leaves of which in autumn become scarlet, are very desirable acquisitions.

The Plane-tree (fig. 947) is sometimes confounded with the sycamore, but it is really a very different tree, and belongs to a different genus (*Platanus*). It is truly a noble tree. There are two species, *P orientalis* and *P. occidentalis*,—both very similar,—but one has been imported from Europe or from the East of Asia, the other from America. The fruit—very unlike that of the sycamore- is globular, and droops gracefully from a long stalk. The plane is now the fashionable tree of the period, and is used extensively in all our London Parks to replace the dying elms. It abounds in the gardens of our London squares. A good example is to be seen in Cheapside, at the corner of Wood Street, and a grand tree of *P. occidentalis* exists outside my garden, on ground in the occupation of Mr. Sheppey. An enormous *P. orientalis* exists in the grounds of Mr. Hayes, in Carshalton village, near running water. The Eastern may be known from the Western tree by its leaves being more deeply cut. The plane is a tree of the highest excellence where magnitude is required, but it has the one great disadvantage of coming into leaf late in spring.

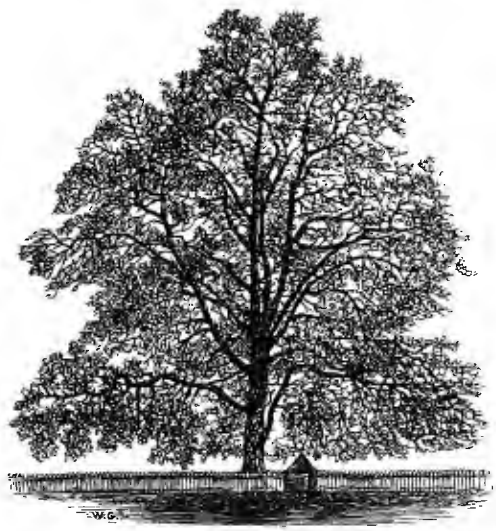


FIG. 947.—Plane-tree.

I have grown the *Ailanthus glandulosa*, which has large leaves with from nine to eleven leaflets. Experiments have been tried to raise the *Bombyx cynthia* on this tree, for its silk, but I believe up to this time without success in England.

Amongst the most beautiful of ornamental trees, the Laburnum stands pre-eminent for the beauty of its flowers, which hang in pendent yellow blossoms so distinct and bright as to shine out and shed their lustre across the garden. It is such a favourite of mine, that

I have at least fifty trees. When planted beside a bright scarlet thorn and a Guelder rose, the combination—especially if conjoined with the flower of the medlar—is marvellous to behold. I have such a group on my swan island; and when the season is favourable, and all the trees blossom at the same time, the effect is more easily imagined than described.

There are two kinds, the *Cytisus Laburnum* and the *C. L. alpinum*, the English and Scotch laburnums; the latter flowering later than the former, and thus prolonging the laburnum blossoming season. The one known as Waterer's variety has blossoms a foot and a half long (fig. 948); of this I have one tree. The laburnum is a strikingly beautiful object in the Tête Noir Pass in Switzerland, where I have seen it in flower in June. In Scotland it is common. Though our gardens are usually ornamented with its brilliant pendent blossom, yet in some years

FIG. 948.—Laburnum Blossom.

FIG. 949.—Arbutus unedo.

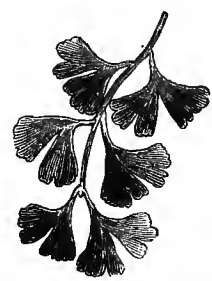


FIG. 949 *a*.—Maidenhair Tree.

the flower-buds are frozen by a late spring frost, and in that case the trees give little, and occasionally no blossom, and my garden is then deprived of one of its greatest charms. The trees are readily raised from the black seeds, which children are sometimes prone to eat, to their own destruction, as they are intensely poisonous.

A lovely evergreen tree, *Arbutus unedo* (fig. 949), which grows naturally in Ireland, and which produces fruit resembling strawberries, succeeds well near London, but does not prosper in my garden, on account of the frost severely injuring it.

For the sake of the blossom I have been careful to adorn my garden with various varieties of Thorn (*Cratægus*). The common Hawthorn (*Cratægus Oxyacantha*) is perhaps as beautiful as any, though many of its varieties cannot be dispensed with in any well-ordered garden. The bright Single Scarlet (fig. 950) is the finest of all, and I have many trees of it. The Double Pink is also desirable, and, though far removed in beauty from the single, should be grown,—though more sparingly. There is one peculiar variety, the Glastonbury Thorn (*C. Oxyacantha præcox*), which flowers about Christmas, of which I have only recently procured an example. The suburbs of London during the brief time the thorn, laburnum, horse-chestnut, and lilac are in flower, are really a paradise; and as this is frequently at Whitsuntide, the Whitsun holiday is—to the bulk of the labouring population of this overgrown city—the most delightful in the year. The thorn is extensively used for hedging, and I have lately tried a novel mode of planting it. Thorns are used about three feet high, and are planted in a double row, crossing each other at an angle of 45°. The object is rapidly to secure a dense, stiff hedge, as the branches interlace in every direction. There are very many distinct species of thorn, many of which it is desirable to cultivate where there is room; I have some four or five.

FIG. 950.—Red May.

> "The hawthorn whitens; and the juicy groves
> Put forth their buds, unfolding by degrees,
> Till the whole leafy forest stands display'd,
> In full luxuriance, to the sighing gales."
>
> THOMSON'S *Seasons.*

There is a beautiful tree, called the Maidenhair Tree (*Salisburia adiantifolia*, fig. 949*a*), which I ought to possess, but do not. The leaves of this tree are formed like the Maidenhair Fern, and the whole tree is exquisitely beautiful.

I find that Mongredien, in his excellent book on trees, states that the Lemon-scented Verbena (*Aloysia citriodora*, fig. 951) will live out

of doors, though sometimes cut to the ground by frost. This I shall try next year, for the scent of the leaves is exquisite. No garden should ever be without a plant, although it is now the fashion amongst gardeners to discard it because it has been common. It is only by the more intelligent cultivators of plants, who are above such silly notions, that it is now grown. It is said to attain a height of twenty feet in China.

FIG. 951.—Lemon Verbena.

I have sometimes used the Hornbeam (*Carpinus Betulus*), but sparingly, and I have no large tree of it. It grows wild to a great extent in Epping Forest, and it is said to be much appreciated for firewood. It is adapted to make hedges of protection.

The Acacia (*Robinia Pseud-Acacia*) is used to shut out low buildings. It grows with great rapidity when young, and has a blossom of delicious scent. The wood is remarkably brittle, and breaks readily from the force of the wind; this causes the trees to become ragged and unsightly. For this reason the tree, although extravagantly extolled by Cobbett, is of but limited utility. "Acacia—that consecrated and venerable tree of the burning bush and of the tabernacle." (STANLEY.)

The Yew-tree (*Taxus baccata*) is useful in a young state to plant in moist places, and under shade, where other trees will not grow, and I use it advantageously for that purpose. In Beddington Churchyard there is a fine yew (fig. 952), and upon the downs about three miles south of my garden it grows wild plentifully and vigorously in the hedgerows, where its dark foliage gives a peculiar character to the landscape. The Irish Yew (*Taxus fastigiata*), or Upright Yew, is a stiff tree of upright growth, and is very useful

FIG. 952.—Yew.

in a position suitable for a tree of that character. It is universally esteemed to be very beautiful, and we have several in my garden. An old tree assumes the form of an inverted pyramid, being broadest at the top.

On a hill south of the chalk downs the Box-tree (*Buxus sempervirens*) grows wild, but I have never seen it so growing anywhere else. We use it for edging the walks, as it bears any amount of clipping. Our forefathers used to cut the tree into the form of birds or animals, which occasionally may be seen in country villages. The best example of clipped trees I ever saw was at the Pope's garden attached to the Vatican in Rome, where amongst other animals a cow with its horns is marvellously rendered by clipping a tree. This horticultural extravagance, though not to be admired, is interesting, as showing the extent to which some trees may be clipped and deformed by ill-bestowed patience and care.

> "The suffering eye inverted nature sees,
> Trees cut to statues, statues thick as trees."—POPE.

On the dry chalk downs to the south-east, the Juniper (*Juniperus communis*) grows abundantly. It is remarkable for the brightness of the colour of the foliage. I have a plant or two. The Red Cedar (*Juniperus virginiana*) is one of the largest trees of the genus, but my soil and climate are not adapted to it, and it speedily perishes.

FIG. 953.—Holly.

In my immediate neighbourhood, at "The Elms," a large Holly (*Ilex Aquifolium*, fig. 953) exists upon the lawn; but at my garden there are only a few small trees of the variegated-leaved varieties, such as the *I. Aquifolium ferox*, or Hedgehog variety, which has the surface of the leaves spiny. There are several other charming kinds, the leaves of which are silver or golden coloured; and though we have not required them in my grounds, that is no reason why they should not be freely grown by others, as they light up the

garden with their brilliantly coloured leaves and berries in wintry snow, when flowers are absent.

The Tulip-tree (*Liriodendron tulipifera*), which has fine flowers (fig. 953*a*), I do not grow. A noble tree exists at the garden of Shepley House, and another at Wallington House.

Amongst all the flowering trees, the Magnolias (fig. 954) are the most remarkable. The *Magnolia conspicua* flowers with me in early spring, and between my garden and London there are many of the glorious *Magnolia grandiflora* trained over the sides of the houses adorning them with noble flowers in summer.

The Catalpa (fig. 955) is a fine ornamental tree, which should be in every garden, as it produces its elegant spike of flowers in August, a time when flowers are scarce. Everyone who has a fine Catalpa is proud of it. It is rather tender; but a large tree, now decaying, exists at Hampton Court

FIG. 953*a*.—Tulip-tree.

FIG. 954.—Magnolia.

FIG. 955.—Catalpa.

Palace, said to have been planted by a Lady Mornington. There is a fine tree in the grounds of Mr. Bristowe, at Clapham Common, which flowers well, but is showing signs of decay. A moderate sized one grows at Wallington House. The one at my garden is just beginning to blossom.

The *Prunus sinensis*, whether for a pot tree or for outdoor growth, is very desirable, and the curious *Prunus triloba* affords the most glorious rose-coloured blossoms in the orchard-house in spring.

We have the Spindle-tree (*Euonymus europæus*) overhanging my

garden from the Park. The fruit is of a bright rose colour, and the tree is a beautiful object in autumn.

I have not the Snowy Mespilus (*Amelanchier Botryapium*), but it is a most desirable tree, having abundance of snowy-white flowers.

The Snowdrop-tree (*Halesia tetraptera*) is little cultivated, although it was introduced into this country, from South Carolina, more than a hundred years ago. Its snowdrop-like flowers, which cover the tree, make it a most interesting object for every garden.

There is only one Palm which lives out of doors in England, the *Chamærops excelsa* (fig. 956). It stands the severest frosts, and blossoms well in the Regent's Park. It grows very slowly in this country, but being an endogenous plant it forms an interesting variety, very different from our ordinary trees. In my garden it grows very slowly, and as far south as Rome and Naples the larger trees are imported.

FIG. 956.—Hardy Palm.

The various Coniferous plants require more space than my garden can afford; nevertheless some interest attaches to the few we possess. Even the common Scotch Fir (*Pinus sylvestris*) lends beauty to the landscape, with its dark green foliage, and when grown with other trees the colour of the bark of the naked stem adds much to the picturesque effect. We have four or five old trees about the place, which are valuable additions. To view the Scotch pine in perfection, it should be seen by the light of the setting sun, when its effect is magnificent. The *Pinus Pinaster*, of which we have only small trees, is a noble pine. I have tried *P. insignis*, which is remarkable for its grass-green colour, but it has been killed by frost, although it flourishes at the top of St. George's Hill. I have not yet ascertained whether the *P. Pinea*, or Stone Pine, which gives such a peculiar character to Italian scenery, will live at my garden.

Of all the Fir tribe, for lawn decoration none can surpass *Abies Pinsapo*. It grows slowly, and is impatient of removal. I killed a splendid tree by removing it. The *Abies Douglasii* is also a fine pine,

of which I have examples; it attains a great height in California. The flag-staff at Kew, which is 150 feet high, is an *A. Douglasii*. A typical specimen may be seen on St. George's Hill, Weybridge. I have no tree of *Picea pectinata*, nor of the Silver Fir; nor of *P. nobilis*, which is a really noble species of pine (fig. 957); nor any large tree of the common Spruce Fir (*Abies excelsa*), which is adapted for large plantations, and of which noble trees exist at Dunkeld, and also at Monnymusk, in Scotland.

FIG. 957.—Cones of Picea nobilis.

Pines are mentioned by Herodotus as follows:—Crœsus "sent to the Lampracenes requiring them to set" Miltiades "at liberty; threatening on their refusal to destroy them like pines. They deliberated among themselves concerning the meaning of this menace from Crœsus, which greatly perplexed them; at length one of their elders explained it, by informing them, that of all the trees the pine was the only one which, once being cut down, shot out no more offsets, but totally perished."

We have three kinds of Cedars,—the *Cedrus atlantica*, *C. Libani*, and *C. Deodara*, but the most eminent botanists consider them as mere varieties of the same species. The *C. Libani* is a very grand tree when it has plenty of room. The largest I ever saw is at Enfield, supposed to have been planted by Dr. Uvedale soon after 1660. Mr. Walford, however, believes it to be still older, and inclines to the traditionary view that it was planted by Cardinal Wolsey. The Rev. A. Bridges has three fine examples of this tree in the grounds attached to his house at Beddington (fig. 958). I have figured two (*a* and *c*),

FIG. 958.—Cedars of Lebanon and Elm.

with a fine elm (*b*) between them. The following are the dimensions of the three cedar trees:—

	1		2		3	
	FT.	IN.	FT.	IN.	FT.	IN.
Circumference at ground	26	0	27	0	27	0
„ four feet above . . .	17	8	16	2	17	6
Height of tree	80	0	90	0	70	0
Greatest spread of branches	94	0	72	0	107	0

The figure of the cedar cones (fig. 959) is from the pencil of Mrs. Jackson. The wood of the Cedar contains a volatile essential oil, which has the curious property of unsettling printers' ink and making it run. Some years ago a Bank of England note was offered to the cashiers with its printing disturbed. Inquiries were set on foot, and it was traced to several individuals, who satisfactorily explained its custody and possession. It was then brought to me, when I suggested that the detectives should inquire whether it had been kept in a cedar box; it was then discovered that the last possessor had kept it in a new cedar box which she had recently bought, and thus the mystery was solved.

FIG. 959.—Cones of Cedar of Lebanon.

The Himalayan variety, the *C. Deodara*, is now a great favourite, and is generally planted at the present time, to the neglect of the *C. Libani*. When young it is very graceful, and the ends of the branches are pendulous. As it grows it raises the ends of its branches, like *C. Libani*. It is somewhat tender, and with me it is occasionally cut down by frost. Trees covered by snow have escaped, but those from which the snow was blown died back. This variety is apt to die when about fifteen or sixteen years old. A friend of mine expressed an opinion that this would be the case, arguing that a mountain variety will not flourish in the plains; and though he planted with the greatest care a number of the healthiest specimens he could procure, it is a remarkable fact that many of his trees have died, as he predicted. Where cedars are required, the *C. Libani*, among large species, is

probably preferable. The effect of *C. Deodara* in a garden is well seen in plate 10.

A gigantic tree, *Wellingtonia gigantea*, or *Sequoia*, has been introduced from California so recently as the year 1854, which is now being planted in every large garden, and does very well in some. It seems to delight in a soil where gold quartz exists, and then it attains the prodigious height of 400 feet, about the same height as the top of the cross on the dome of St. Paul's Cathedral. It is a tree which requires much light and air, with a damp soil; and the proximity of other trees, even at a considerable distance, impairs its symmetry and growth. I raised one from seed, which is now sixteen feet high, and its girth at the ground three feet; its growth is most symmetrical and beautiful (fig. 960). Mr. Jackson, at Beechwood Lodge near my garden, has a good specimen.

FIG. 960.—Wellingtonia gigantea.

A Wellingtonia was planted in the pleasure-grounds of Strathfieldsaye by her Grace the Duchess of Wellington in April 1857. In January 1872 his Grace the Duke of Wellington had it measured, when it was found to be 30 feet high, 8 feet 7 inches round the trunk at the ground, and 5 feet 4 inches in circumference four feet from the ground. The diameter of the branches was 18 feet 6 inches.

Two other trees, which were used to decorate the supper-table on the occasion of a ball at Apsley House, at which her Majesty and the late Prince Consort were present, were planted in October 1865 near the monument to the late Duke of Wellington. One is now 18 feet 4 inches high, the other 17 feet 9 inches; the circumference of the trunk at the base of the first being 3 feet 7 inches, of the second 4 feet, and the diameter of the branches 10 feet 6 inches and 10 feet respectively. As these trees were properly planted, and have been well cared for, they fairly exhibit the normal growth of the species in this country under favourable circumstances. Having also an

historical interest, this record, which has been kindly supplied to me by the Duke himself, will serve as a basis from which the rate of growth of this noble tree may in future be determined.

A forest of Wellingtonias is situated in a small valley near the head waters of San Antonio, in California. It contains ninety-three trees about ten years old. The "Father of the Forest" (fig. 961), perhaps the largest tree in the world, is thrown down, and is supposed to have been 453 feet high and 40 feet in diameter. Its interior is hollow and burnt, but the cavity is sufficiently large for a man on horseback to ride inside. Mr. Townsend, who visited this spot, kindly lent me a photograph of this tree to figure. I have also illustrated part of a tree called "George Washington," which is represented as a first-class tree 384 feet high (fig. 962). The form of my young trees is exquisitely symmetrical; the branches for the first few years grow horizontally outwards, but after a time they take an upward direction, and are not then quite so beautiful. They propagate freely from cuttings, but trees so procured are not so desirable as seedlings, which should invariably be employed where a proprietor desires his posterity to see this tree in perfection. The cones are very small (fig. 961 *a*).

FIG. 961.—The "Father of the Forest."

FIG. 961 *a*.—Cone of Wellingtonia gigantea.

FIG. 962.—"George Washington."

The stiff, radiating branches of the Puzzle Monkey-tree (*Araucaria imbricata*) give it a character so peculiar that it contrasts strongly with every other tree in the garden, and gives a pleasing variety to the scene. It is much more hardy when thoroughly exposed to the light than when apparently protected by shrubs. It bears the snow on its

stiff branches with impunity, but severe frost is apt to brown the leaves. I have several plants, and had several others, which were killed through moving. The first planted in this country is at Kew, but one of the finest is in the garden of the late Mr. Tabor (fig. 962*a*), at Brentwood. In Chili, its native country, the cones are reported each to yield two or three hundred seeds, and to be an important article of food for the Indians, just as the seeds of the stone pine are an article of luxury to the inhabitants of Italy. I have seen cones formed in this country.

In Beddington Park, near the church, are two fine Larch-trees (*Larix europæa*), which must be of considerable age (fig. 963). Several

FIG. 962*a*.—Araucaria imbricata.

FIG. 963.—Larch in Beddington Park.

FIG. 964.—Larch at Dunkeld.

trees were imported from the Tyrol in 1738, and five were left at Dunkeld. The two in Beddington Park are not so old as two now growing at Dunkeld, nor as some growing at Paradise in Monnymusk parish, Aberdeenshire. One of the first imported was kept in the dining-room at Monnymusk House till too large, and then was planted out in the avenue of beech-trees. This larch is not nearly so large as those magnificent trees at Dunkeld, one of which is fifteen feet round at three feet from the ground, and 96 feet high (fig. 964). The Larch is a very beautiful tree in early spring, and has proved highly remunerative to those who planted it fifty years ago, as it has been used extensively for railway sleepers. Of late years it has become liable to

disease; it has been attacked by aphides, and becomes unhealthy, and the whole tree frequently dies. I have particularly observed that in the Tyrol it grows on vertical sides of the mountain, one tree above another, so that every part of each is thoroughly exposed to the air and light of the sun. Whether in this country the trees do not get their natural conditions, whether they have been planted amongst the rotting roots of former larches infested with the mycelium of fungi, or whether the seasons have been unpropitious, or what other causes have been at work, does not appear to be thoroughly understood.

On the Apennines, the Cypress (*Cupressus sempervirens*, fig. 964*a*) forms a conspicuous feature of the landscape, clothing the sterile sides

FIG. 964*a*.—Cupressus sempervirens.

FIG. 965.—Cupressus Lawsoniana.

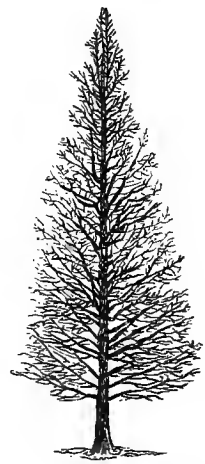


FIG. 966.—Taxodium Distichum.

of the mountains to their bare tops. In the environs of Florence there is a grand grove of cypresses, of large size; their dark foliage is well adapted to give shade from the intense light of an Italian sky. We do not grow the tree to any size. I have tried the *Cupressus funebris*, from China, without success; but the *Cupressus Lawsoniana* (fig. 965), which was introduced from California in 1852, grows rapidly with me, nearly as fast as the Wellingtonia; it seems to like a soil which is always moist, and its form is so fine that it is a desirable tree to have in every garden.

The Deciduous Cypress (fig. 966) is to my mind a most elegant

tree: the cut leaves are delicate when the foliage is green, but in autumn also the tints are fine. I have a tree of this species, which I greatly admire, but there are two in the neighbouring garden which are models of beauty, and which are the admiration of every passer-by.

I planted a great many trees of *Cryptomeria japonica*, which grow freely, but are liable to be so much disfigured by frost as to render them almost ineligible for a garden. A typical tree may be seen on St. George's Hill, which well exhibits its pyramidal form.

The *Arbor-Vitæ*, or *Thuja*, is a perfectly hardy tree, well adapted for screens. There are other species, which I have not grown. I do not know a more excellent tree for a lawn than the golden variety of the *Biota orientalis*, or Chinese *Arbor-Vitæ*. The brilliant colour of its newly-formed branches is intense, and the general form of the tree is extremely elegant.

There are many fruit-trees which are used as forest trees. The Walnut (fig. 967), which abounds in Carshalton Park, is one. The annexed figure is drawn from a walnut-tree near Beddington Hall. The Wild Cherry-tree is extremely beautiful when covered with its white flowers, and in autumn its scarlet leaves render it again very attractive. The double varieties are very charming, and are much prized. The Pear-tree attains majestic proportions, but is not handsome. The Siberian Crab-tree is twice in the year a beautiful sight,—once when covered with its lovely blossom, and again with its useful fruit. The Elderberry-trees, especially the scarlet variety, are all additions to our trees. The Spanish Chestnut is a fine forest tree. Very large trees grow in Carshalton Park. Its produce in the southern parts of Europe is valuable, and it demands more attention in England than it has received.

FIG. 967.—Walnut-tree.

In any situation where it will grow, a tree or two of the Spanish Chestnut should never be omitted.

Bounding the north-east side of my garden, and protecting it from cold winds, a bank of trees exists, which is glorious when lit up by the setting sun, and grand when reflected in the lake:—

"Let lofty firs, and ashes cool,
My lowly banks o'erspread;
And view, deep-bending in the pool,
Their shadows' wat'ry bed!"—BURNS.

It is composed of the elm, beech, horse-chestnut, willow, alder, birch, poplar, ash, sycamore, and Scotch pine. The contrast of foliage afforded by the various trees is picturesque, and the diverse tints which the leaves assume in autumn is particularly fine. By the great kindness of the Rev. A. H. Bridges, I have been permitted to use a walk under this grove of trees, which skirts Beddington Park. It is difficult to estimate the value of such a permission, which gives to my garden the "little wood beside the crystal stream" which Horace desired, and which Milton described:—

"A pleasant grove,
With chant of tuneful birds resounding loud;
Thither he bent his way, determined there
To rest at noon; and enter'd soon the shade
High-roofed, and walks beneath, and alleys brown
That open'd in the midst a woody scene;
Nature's own work it seem'd (Nature-taught Art),
And to a superstitious eye the haunt
Of wood-gods and wood-nymphs."

There are many large trees in my neighbour's grounds to the south-west of the garden, which tower over the houses, and look like a forest. One or two Lombardy poplars out-top the other trees, and break the outline, adding materially to the picturesque effect.

"One impulse from a vernal wood
May teach you more of man,
Of moral evil and of good,
Than all the sages can."
WORDSWORTH, *An Evening Scene.*

The Almond-tree (*Amygdalus communis*) is indispensable, on account of the beauty of its flower in early spring, and valuable also for its fruit (already described). The Double-blossomed Peach (*Amygdalus persica*) is very fine, and, besides, yields edible fruit at the end of October or in November. Mr. Fortune introduced some exquisitely coloured varieties of flowering peaches; I have tried them, but they have not succeeded in my soil and climate, although they are most desirable spring blossoming trees.

SHRUBS.

No garden can dispense with shrubs, and perhaps for general utilit the Laurel (*Cerasus laurocerasus*, fig. 968) has no peer. Its bright green leaves are invaluable, especially as it will grow in almost every situation, and even under the shade of trees. When the wood is thoroughly ripened it will stand any frost, but immature and sappy shoots are frequently killed in winter. It is better in a dry than in a wet situation, and, as was pointed out by the great naturalist Gilbert White, it stands severe winters better in a northern than in a southern situation, where the snow is alternately melted and frozen. We use it in many places where an evergreen or a screen is needed. It may be easily propagated by cuttings planted in September. The leaves on distillation yield prussic acid, and the laurel water is highly poisonous.

FIG. 968.—Laurel.

Where a very large shrub is required the Portugal Laurel (*Cerasus Lusitanica*) may be employed. Girgov describes a Portugal laurel which had a trunk eleven feet in circumference and was thirty feet high, with a head fifty-four feet in diameter. This species has only been employed at my garden with the same object as the common laurel, but it does not submit to removal so well as that shrub.

I have had Bay-trees (*Laurus nobilis*), but they have been always greatly injured by the peculiar climate of my garden.

There is considerable difficulty in growing the Laurustinus (*Viburnum Tinus*), as the frost is apt to kill it. There were at one time fine specimens of this kind of shrub at Hampton Court Gardens which were killed by frost one severe winter; and at the Hazel Park, in Bedfordshire, the shrubberies were much defaced by nearly the whole of the laurustinuses being destroyed. It does not thrive in my garden; but its property of flowering in winter, and the delicate odour of the flower, render it a very desirable addition to any garden in which it will flourish.

Whether for shade, for hedges, or for the evergreen character of its leaves, I have ever found the Privet (*Ligustrum vulgare*) to be useful, from its hardiness. The dark purple berries are ornamental in winter. There are several varieties of it which I do not grow.

I cannot say that the Blotch-leaved *Aucuba japonica* is a great favourite of mine, although it is abundant in every suburban garden, and is perfectly hardy. Though introduced in the year 1783, it was only within the last few years known to be bisexual, and that the female plant only was propagated in this country. However, the male plant has been at length introduced, and the blossoms of the female tree may be fertilized, when it afterwards becomes covered with red berries. I have readily obtained the red berries on trees flowering in the orchard-house, but as yet I have not myself seen trees fertilized out of doors, though, as they are usually covered with a profusion of blossom, it is possible that at a future time we may see the outdoor trees also covered with scarlet berries, if our climate is favourable to the development of the fruit.

The Phillyreas, of which there are three species, are not much grown in gardens,—not nearly so much as they deserve, for the foliage is very fine, the tree is perfectly hardy, and the habit close and admirably adapted for a screen, for which purpose I have used it; it may also be advantageously grown as a single tree.

For forming a screen the Snowberry (*Symphoricarpus racemosus*) is very useful, as it will grow under trees, and may be easily transplanted. When covered with its large white berries, it is very ornamental.

The holly, box, and yew are trees which may be made to assume a shrubby character, and which are also well adapted for screens.

The Black Nut (*Corylus Avellana purpurea*) is likewise a highly ornamental tree, from its dark purple foliage, and it partakes of the character of a shrub when young.

One of the loveliest amongst flowering shrubs, which we profusely grow, is the Lilac, of which there are two species (*Syringa vulgaris*, fig. 969, and *S. persica*) and many varieties. Either kind would be a useful shrub, even if it had no flowers, as from the abundance of its fibrous roots it can be readily moved to any place where a large shrub is required, and the tree itself may be cut about as the gardener pleases; but in addition to these good qualities, the perfume of lilac is delicate, and its flower most agreeable: hence we grow many bushes, and several varieties. In Paris, and especially in the Tuileries Gardens before the people in their madness destroyed them, the lilac was trimmed to the form of a standard rose, with a globular head, and in that shape it was well adapted to formal gardens. Of the large lilac there are two varieties, lilac and white, and of the Persian lilac many varieties, differing in the intensity of the colour of their flowers. The lilac is readily forced. I have frequently had it for table decoration on Christmas Day, but in Paris it can be obtained in quantity in the middle of December. Wherever there is sufficient room, lilac blossom should be secured throughout the winter. For forcing, the plants should be well established in pots, as they do not succeed if removed directly from the open border. Whilst growing they require abundance of water. The flower of the forced plant is even more deliciously scented than the plant grown in the open border.

FIG. 969.—Lilac.

FIG. 970.—Mock Orange.

Another fine shrub is the Mock Orange (*Philadelphus coronarius*, fig. 970). The flower is creamy white, and has a smell like the blossom

of the orange. It is a great favourite of mine. I have also the *Philadelphus mexicanus*, which has charming single white fleshy flowers. It flowers freely in a pot with me, but I do not as yet know whether it is hardy. If it is, it will be a truly beautiful species for outdoor growth.

In early spring the bright red blossoms of the Japan Quince (*Cydonia japonica*, fig. 971) are important. The tree does best when trained against a wall, but we have several bush trees, which give us their flowers in early spring, and are highly effective.

Another early flowering shrub is the *Daphne Mezerium*, which flowers before the leaves appear, but it is not an important plant.

FIG. 971.—Japan Quince.

FIG. 972.—Red Flowering Currant.

FIG. 973.—Berberis dulcis.

Blossoming later than the last, we have the Red Flowering Currant (*Ribes sanguineum*, fig. 972). There are several varieties, which are useful accompaniments of the wall-flowers. It is an American shrub, of easy cultivation and hardy, but last spring it received much damage at my garden from the May and June frosts.

Still later, the *Deutzia gracilis* gives us an abundance of white flowers. This shrub, although hardy, is also a valuable plant for greenhouse decoration, and many plants should be used, so that one after another may adorn the conservatory.

For the spring the *Berberis* is useful. The *Berberis dulcis* (fig. 973) has single yellow flowers, delightfully fragrant, which are followed by black berries reputed to be eatable.

The *Mahonia aquifolium* is a plant with large dark leaves and yellow blossom, which should never be absent from any garden.

In spring, one of the grandest flowers of my garden is the Guelder Rose (*Viburnum Opulus*, var. *sterile*, fig 974). It grows very freely, and the flowers are larger than I have ever seen elsewhere. When in blossom, its large white flowers can be seen from one end of the garden to the other.

For the summer, the Spiræas are very desirable acquisitions. The Meadow-sweet (*Spiræa Ulmaria*) is one of our elegant weeds. The *S. callosa* from Japan is like a meadow-sweet with red flowers, and always delights us with its elegant blossoms. It should be more frequently grown.

FIG. 974.—Guelder Rose.

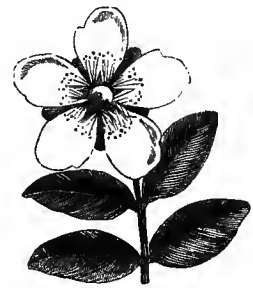


FIG. 975.—St. John's Wort.

FIG. 975*a*.—Skimmia japonica.

Towards the end of summer, the St. John's Wort (*Hypericum calycinum*, fig. 975) produces large yellow solitary flowers; and we have other English hypericums in our alpinery.

There is one shrub, the Eglantine or Sweet Briar (*Rosa rubiginosa*), which we grow for its triple attractions: firstly, for the beauty of its blossoms in early spring; secondly, for the bright scarlet berries produced in autumn; and thirdly, for the delicious fragrance of its leaves, which is plentifully exhaled in its growing state especially after a shower of rain.

The *Eugenia ugni* (fig. 387) will not live out of doors with us, although, trusting in its reputation for hardihood, I lost at least a dozen specimens. I do not think that either the Pomegranate or the Loquat would live out of doors in my garden; at any rate, I have not ventured to place them out. I have seen the Loquat growing on a south wall at Weybridge, at the garden of Mr. Harrison.

I have not planted out the *Skimmia japonica* (fig. 975*a*), although it is quite hardy ; nor the *Illicium religiosum*, which I have several times procured, and as often contrived to lose.

However beautiful other flowering shrubs may be, every garden must possess its beds of American plants, comprising Rhododendrons, Azaleas, and Kalmias. The garden varieties of *Rhododendron Catawbiense* are now very numerous, and fresh ones are continually being added to the list. The varieties of colour are numerous, but scarlet and purple predominate. Singularly enough, our peaty soil appears to be poisonous to them, as they speedily die, though they naturally live in another kind of peat or fibrous loam, which we have to obtain from Mitcham Common or elsewhere. The Scarlet Rhododendron (fig. 976) and ferns mix charmingly together, as the harmony of colour between the scarlet flowers and the green fronds in early spring is perfect. I have rhododendrons in each fernery, but it requires skill to keep them alive, so pernicious is our natural soil to them. The art of the florist is never shown to greater advantage than in the production of varieties of rhododendrons, which are superb in the beauty of their form and in the brilliancy of their colours, whereas the original plant has flowers of a dingy purplish colour, not very attractive in my opinion. I have never paid much attention to the names which florists have assigned to their varieties, but Mr. Veitch has kindly supplied me with the following list of kinds which he considers of undeniable excellence, and which he recommends as the finest kinds in cultivation :—

FIG. 976.—Scarlet Rhododendron.

Blandyanum : reddish crimson.
Brayanum : rosy scarlet.
Concessum : rosy pink.
John Waterer : glowing crimson.
Joseph Whitworth : purple lake.
Madame Miolan Carvalho : pure white.
Michael Waterer : rosy scarlet.
Minnie : bluish white.
Mrs. John Clutton : white.
Ochroleucum : pale yellow, very dwarf.
Grand Arab : brilliant crimson.
Broughtonianum : rosy red, early flowering.

The Alpine rose (*R. ferrugineum*), which charms travellers so much in summer during their excursions amongst the Alps, is a rhododendron of a different species from the *R. Catawbiense*. It requires peaty soil, and as its associations are so pleasing I grow it in my alpinery.

The *Rhododendron arboreum* grows well in greenhouses, but it occupies so much room that I have never had a plant. The *R. Ponticum* is a vigorous species on which the finer varieties are usually grafted.

The Azalea is also a suitable congener with the Rhododendron. The Yellow Azalea (*Azalea Pontica*, fig. 977) does pretty well with me,

FIG. 977.—Yellow Azalea.

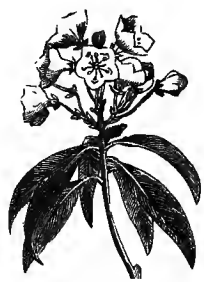


FIG. 978.—Kalmia latifolia.

FIG. 979.—Andromeda speciosa.

but the varieties of the *A. viscosa* are specially liable to have their young shoots and blossoms frozen by the May frosts, and are so tender as practically to be useless in my garden. The following five are particularly recommended upon Mr. Veitch's authority :—

Altaclarense : deep yellow.
Julius Cæsar : deep scarlet red.
Ne Plus Ultra : bright orange scarlet.
Prince Henry des Pays Bas : decp scarlet.
Viscocephala : sulphury white, finely scented.

Amongst the rhododendrons and azaleas, a plant of the Allspice (*Calycanthus floridus*) should always be placed. The flowers are deliciously scented.

In the American bed the beautiful *Kalmia latifolia* (fig. 978) should also always be planted. It requires a peaty soil, and does not thrive with me. I have planted at least a dozen plants of them, of which I do not think that more than one now survives.

The Periwinkles, or Vincas, are desirable shrubs for shady situations. The larger variety (*Vinca major*) has bright blue flowers; and the smaller, whether single or double, or whether having green or variegated leaves, are exceedingly charming in spring.

The *Andromeda speciosa* (fig. 979) is very elegant when in flower in the early spring, but I have not yet attempted to grow it.

I have not a plant of the Venetian Sumach (*Rhus cotinus*, fig. 980). It is a curious, interesting plant, and grows well at Wandsworth Common, in the grounds of Mr. P. Rose, from whose beautiful shrub the annexed wood engraving has been drawn.

FIG. 980.—Venetian Sumach.

FIG. 981.—Bog Myrtle.

FIG. 982.—Myrtus communis.

In the damp places of the garden the aromatic Bog Myrtle (*Myrica Gale*, fig. 981) grows. It abounds in Scotland in the Mosses, and in Yorkshire they make gale beer of it. The leaves exhale a delicious perfume, especially when bruised.

The Yuccas always form striking objects for a garden. The *Y. gloriosa* is by far the largest. It has a bad habit of throwing up its wonderful spike of bell-like flowers so late in autumn that it does not come into full blossom before the frost destroys it. Nevertheless it cannot be dispensed with on account of the distinct contrast to all other plants which it presents. The *Y. filamentosa* flowers well with me.

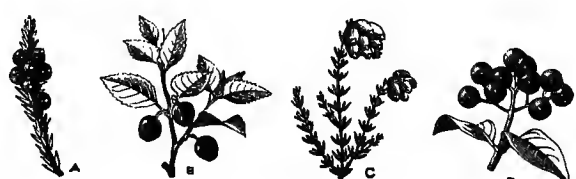
The Myrtle (*Myrtus communis*, fig. 982) is a classical plant, which flourishes in South European countries. According to Herodotus, the

Persians made their invocations or prayers wearing a tiara encircled generally with myrtle. And again Herodotus states, that "whilst the Persians waited for the rising of the sun, they burned on the bridge all manner of perfumes, and strewed the way with branches of myrtle." Among the ancients the myrtle was expressive of triumph and joy; the hero wore the myrtle as a mark of victory; the bridegroom on his bridal day; and friends presented each other with myrtle garlands in the conviviality of the banquet. So greatly was this shrub prized, that Venus is said to have been adorned with it when Paris decided in her favour the prize of beauty, and for that reason it was deemed odious by Juno and Minerva. At the festival of Bona Dea at Rome myrtle was excluded, probably from this reason. The Myrtle will hardly live near London. It may survive some winters, but is generally killed by severe frost, so we must content ourselves with using it for conservatory decoration or protect it in the greenhouse during winter.

FIG. 983.—Heather.

Besides all these trees and shrubs, we grow the common Heather (*Calluna vulgaris*, fig. 983), one of the finest of all plants; the *Linnæa borealis;* the *Empetrum nigrum*, or Crowberry (A); the *Erica herbacea*, which flowers with the snowdrop; *Erica Tetralix*, or common Heath (C); the English and American Cranberries, the Bilberry (B), the Dogberry (D), the Cloudberry, and the Stoneberry; many of which I have described elsewhere.

"What should I tell you more of it?
There was so many trees yet,
That I should all encombred bee
Ere I had reckoned every tree."—CHAUCER.



Vign. XXIV.—Crowberry. Bilberry. Heath. Dogberry

Vign. XXV.—Heron by River.

CHAPTER XIII.

THE ANIMAL KINGDOM.

"Go, from the creatures thy instructions take :
Learn from the birds what food the thickets yield ;
Learn from the beasts the physic of the field ;
Thy arts of building from the bee receive."—POPE.

THE ANIMALCULES IN THE WATER.

THE water in the river and little streams abounds with animalcules: not that they are diffused, as frequently supposed, throughout the water, for in the clear running part there are comparatively speaking none at all; the living creatures confine themselves to the edges and bottoms of the stream, or attach themselves to weeds, sticks, or stones.

The first living creature to be noticed, which exists in consi quantities at times in our waters, is the *Amœba* (fig. 984), an apparently shapeless mass. Dr. Moxon, who has particularly examined many of the animalcules which dwell in the waters of my garden, remarks that without muscles the amœba contracts, without nerves it feels, without a mouth it swallows, and with no stomach it digests its food. The way in which the amœba encircles its prey, wraps itself round it, and digests it, is certainly most remarkable; nevertheless I think we have too imperfect an acquaintance with the internal structure of this creature to build up theories as to its nature and organization.

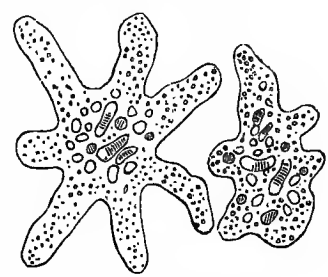


FIG. 984.—Amœbæ, magnified.

Our brooks also contain more minute creatures, called Monads (fig. 985). They are chiefly found in stagnant corners in the lesser streamlets.

We have likewise the *Siagontherium tenue* (fig. 986) and *Bursaria vernalis* (fig. 987), both of which were considered to be polygastric animals. Very little is known either of their structure or natural history, though we may conceal our

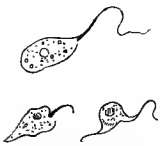


FIG. 985.—Monads, magnified.

FIG. 986.—Siagontherium tenue, magnified.

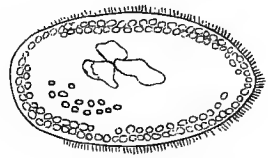


FIG. 987.—Bursaria vernalis, magnified.

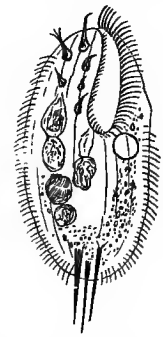


FIG. 988.—Stylonichia, magnified.

ignorance by the use of long and repulsive names. A very active animalcule called *Stylonichia* (fig. 988), which moves about in all directions, lives in the stagnant parts of our streams.

Amongst other infusorial animalcules, we have an interesting creature living in a kind of pot, which is called the

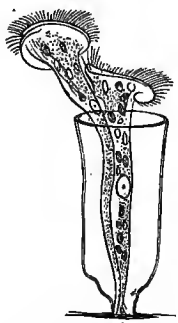


FIG. 989.—Vaginicola, magnified.

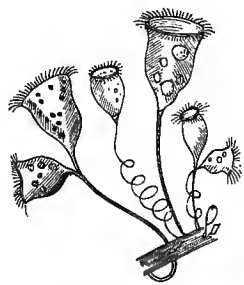


FIG. 990.—Vorticella, magnified.

Vaginicola (fig. 989); but of all this family none is more interesting and beautiful than the *Vorticella* (fig. 990), which, as seen under the microscope, comes up like a sky-rocket to seize on its prey. It lives attached to the leaves of plants in the river.

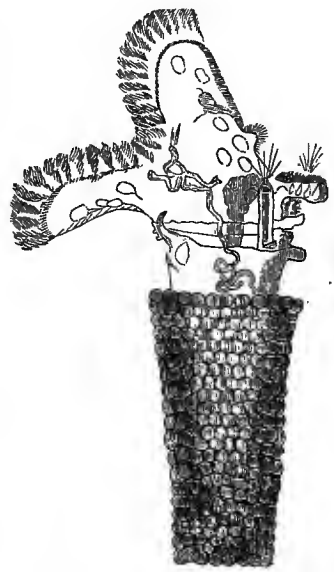


FIG. 991.—Melicerta ringens, magnified.

Attached to our water weeds, we have that very beautiful and interesting species of the Rotatoria, the *Melicerta ringens* (fig. 991). Specimens from my garden have been the subject of a very interesting paper by Dr. Moxon, read before the Linnæan Society. It builds a case for itself with little bricks of particles of mud. It is a choice subject for the microscope, and may be watched with interest for hours. It can be easily kept in a bottle with a piece of water weed, such as the water ranunculus. Microscopists amuse themselves by giving it particles of different bright colours with which to construct its house and by this plan they obtain a case of many colours.

POLYPI.

No more interesting creatures dwell in my garden than the Polyps, of which we have two or three species, among them the *Hydra viridis*, *H. communis* (fig. 992), and *H. fusca*. The tentacles of these creatures appear to have some stinging or poisonous properties, as when they touch an animalcule it becomes paralysed. Formerly they were thought to be simply bags, into which their prey was thrust and then digested. Now the researches of modern zoologists have shown that polyps have a higher organization, and Dr. A. Farre's papers read before the Royal Society have contributed to our knowledge of these interesting creatures.

FIG. 992.—Hydra communis, magnified.

WORMS.

There are several kinds of worms in my garden, and their quantity appears to have visibly increased with the cultivation of the soil. The Earth-worm, Lob-worm, or Dew-worm (*Lumbricus terrestris*) is found, but not in such quantities as in the valley of the Thames, where gallons are collected after rain as bait for barbel. This worm burrows many feet under ground. It appears to eat vegetable mould, but during the winter it drags leaves into its holes—for what purpose it is not easy to tell.

When worms get into pots the plants are damaged, and to prevent this the gardener stands his plants on ashes or on boards. The Earth or Lob Worm (fig. 993) is about eight inches in length, is hermaphrodite (Nos. 2 and 3), and lays eggs (Nos. 4 and 5). At night, after a fall of rain, it comes to the surface, but leaves the end of its tail in its hole, and on the slightest noise rapidly withdraws. If a grassplot is examined at night, by the aid of a lantern, when the worms have come out, it is a remarkable sight, as the grass is covered with them. By the action of this creature so much earth is said to be brought to the surface of the ground as completely to cover chalk laid upon it, after a few years. Nevertheless, I rather doubt the explanation.

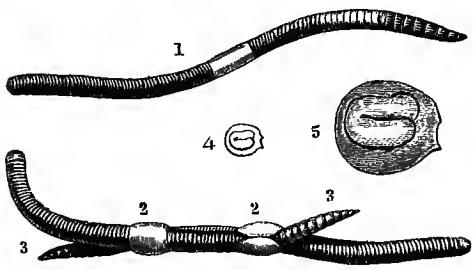


FIG. 993.—Earth or Lob Worm.

The Red Worm (*Lumbricus minor*) is also found in wet ground under stones. It is from two to three inches in length, and fish are particularly fond of it. We have also the Green Worm (*Lumbricus viridis*), which is discarded by the angler, and which lives under stones.

In my garden there is great abundance of the Brandling (*Lumbricus fœtidus*). It is marked alternately red and yellow; it lives in manure heaps, and has an unpleasant odour, which clings to the hands after touching it. It is a favourite bait for perch.

LEECHES.

We have Leeches in our lake. I have not determined the species, but one kind is possibly the *Hirudo piscium*.

FRESH-WATER SPONGE.

We have one fine species of Fresh-water Sponge, which grows upon the wall near the flood-gates, and also on the walls of the mill; it is

called the *Spongilla fluviatilis* (fig. 994). It is composed of siliceous spiculæ, in which the animal dwells, and when dry it very much resembles the sponge we commonly use. It soon dies when removed from the water.

FIG. 994.—Fresh-water Sponge, magnified (showing spicules).

FIG. 995.—Fresh-water Shrimp.

FIG. 996.—Woodlouse.

CRUSTACEA.

The Upper Wandle does not contain the Crayfish (*Astacus fluviatilis*), which I have often caught in the New River, Lea River, and Thames, in the latter of which they abound at and above Oxford. I have placed many in our river, but they have disappeared, which is another failure in acclimatization. From this creature the Bisque soup of the French is made.

One aquatic species of Crustacean is of great value to us, the Fresh-water Shrimp (*Gammarus fallax*, fig. 995). It exists literally by myriads at the bottom of the river under every stone, and affords abundance of food for the trout, which are very fond of it.

Another Crustacean is terrestrial, and does us much mischief. It is the Woodlouse (*Oniscus asellus*, fig. 996), of which there are more than one species. It delights to sally forth by night to devour the delicate parts of the plants in our glass-houses, and it is especially annoying to notice the injury they do to the roots and young shoots of our valuable orchids. The gardener traps them by cutting a potato in half, scooping out a portion, and turning the cavity downwards, when the creatures collect underneath, and can be taken and destroyed.

Perhaps, however, the best remedy for woodlice is the toad, which eagerly devours them, and no good gardener is ever without his pet toads, who thus do him much service.

To return to the water: there are many microscopic species of Crustaceans, such as the *Cyclops*, which are supposed to afford food for

young trout. Belonging to this tribe, we have abundance of the *Cyclops quadricornis* (figs. 997 and 998), which are interesting creatures to watch in an aquarium. We have also the *Daphnia Pulex* (fig. 999), which is common everywhere.

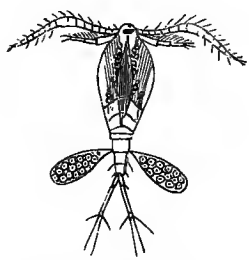


FIG. 997.—Cyclops quadricornis, magnified.

FIG. 998.—Ditto, side view, magnified.

FIG. 999.—Daphnia Pulex, magnified.

FLEAS.

There are many species of Fleas. One species infests the dog, another the cat, and most birds have their particular flea; but of all the many species it is remarkable that the one which lives upon the mole, the *Pulex talpæ*, has no eye. The larva of the *Pulex irritans*, the bite of which drives some persons almost mad, is propagated by egg. The larvæ of the flea live upon filth or in the nests of birds. According to Cuvier, in about ten days after birth they spin a silken shell, and in another ten days emerge in a perfect state. The fleas on the creatures in our garden might alone constitute a long study.

PARASITES.

FIG. 1000.—Parasite of the Ox, magnified.

The remarkable book of Denny has taught us how many Parasites there are upon our birds and animals, and even upon man. Denny has pointed out that the same species may live upon many birds. I have many kinds in my collection, and have figured one as an example, the Parasite of the Ox (fig. 1000); but species may be found on nearly every living creature, and on some creatures more than one kind.

ENTOZOA.

In considering the creatures inhabiting the garden, the Entozoa must always be mentioned, as they live one life on vegetation, a second life in different animals, and a third life in man: therefore, the present life in the garden may become the future life in our bodies, in the form either of tapeworms in our intestines, of the *Trichinia spiralis* in our muscles, of the *Filaria* in our eyes, or of the *Hydatids* in our brain.

There is hardly a creature living in the garden which has not its entozoa, and therefore I can only allude to the more important, which are especially interesting to man himself.

Dr. Cobbold, a great authority on entozoa, has pointed out that one of the tapeworms which infest man, the *Tænia mediocanellata*—known also as the Beef Tapeworm, or Unarmed Tapeworm—is developed from an egg. This egg (fig. 1001) is passed by man to the grass, where it is swallowed by the cow. The egg, on passing into the stomach, has the exterior case dissolved by the gastric juice, when by means of six piercers it passes to the flesh of the cow, where it grows and lives and

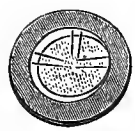


FIG. 1001.—Egg of Beef Tapeworm, magnified.

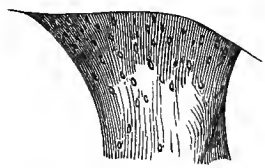


FIG. 1002.—Beef Measles.

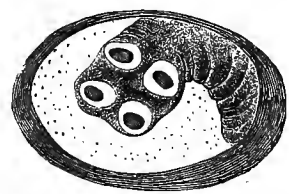


FIG. 1003.—Beef Tapeworm, magnified.

constitutes the so-called Measles (fig. 1002); a little sac in the flesh or meat about the size of a hemp-seed, but more irregular in form. In this sac the creature resides (fig. 1003), but is still immature, and the flesh has to be eaten by man before it can be fully perfected, when on passing into the stomach it becomes the Beef Tapeworm (fig. 1004), having from a thousand to twelve hundred joints. All the joints beyond 450 are mature, and capable of producing eggs. Each mature joint has been calculated to produce 45,000 eggs, and from a calculation made on a joint in my cabinet 30,000 ova at least exist, which shows the terrible fecundity of this tapeworm pest.

FIG. 1004.—Head of Beef Tapeworm, magnified.

Another Tapeworm, the Armed Tapeworm (*Tænia solium*, fig. 1005), produces eggs which when devoured by swine give rise to measly pork (fig. 1006). When this is eaten by man a perfect tapeworm arises, which again passes eggs, to be again eaten by swine. If the eggs are taken into the stomach of man, they give rise to *Cysticerci* (fig. 1007), or measles, and if they travel to the brain they may cause fatal results.

The tapeworm of the dog lives in man as the *Echinococcus*, or Hydatid tapeworm (fig. 1008). All the figures are from Cobbold.

FIG. 1005.—Head of Tænia solium, magnified.

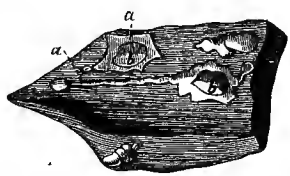


FIG. 1006.—Pork Measles, nat. size. *a a*, the cysts; *b b*, tapeworm larvæ.

FIG. 1007.—Cysticercus cellulosus, magnified.

FIG. 1008.—Hydatid Tapeworm, magnified.

The curious story of the tapeworms teaches us to eschew badly cooked meat, and also to be careful that our animals do not eat the eggs of the future tapeworms with their vegetal food. Dr. Cobbold has pointed out the danger of allowing cattle to graze on sewage grounds, where the eggs of tapeworms must of necessity be distributed. I believe myself, from all I can learn (though up to this day I have been unable to verify the fact as a matter of legal evidence), that many beasts, and most sheep, become diseased on the sewage-grounds. Nevertheless I hear that one ox was fed upon the produce of the Romford sewage-grounds, and when killed was found healthy. Upon our present information we ought to beware of sewage-fed cattle, if we desire to avoid future tapeworms.

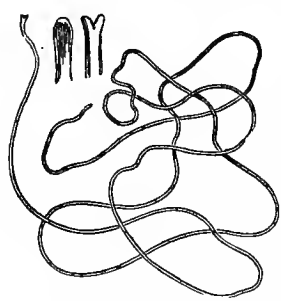


FIG. 1009.—Hairworm.

The outside life of many of the entozoa is unknown: that of the Threadworm is of this class.

In all our streams we have a curious worm, called the *Gordius*

aquaticus (fig. 1009), or Hairworm. It lays eggs, which are supposed to be devoured by insects and developed in their bodies.

It is impossible to describe all the entozoa which live in the numerous creatures inhabiting my garden, and still more so to describe the different states in which these creatures live, with their wanderings.

MITES.

We have numerous species of Mites in my garden, of which I have many specimens in my microscopic cabinets. The *Acarus domesticus* lives upon cheese, and the *Tyroglyphus farinæ* (fig. 1010) upon flour. One species is parasitic on man in a diseased state, namely the *Sarcoptes Scabiei*, both of which I have seen in the hospitals in London and in Paris. There are many species which live upon animals; such as the Mouse Mite (*Myobia musculinus*) on the mouse; others upon birds, as the Sparrow Mite. Some mites live upon other insects: we constantly see one species of mite, the *Gamasus coleoptratorum*, upon the great dor beetle: and in our streams there are many kinds of mites. One species is terribly destructive to our cabinet insects, namely the *Tyroglyphus destructor*.

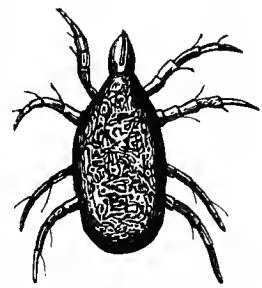


FIG. 1010.—Tyroglyphus arinæ, magnified.

PLANT MITES, OR RED SPIDERS.

Plant mites are a most terrible pest to the horticulturist. Although so small, they come in vast armies and spin a thread on the under surface of the leaves of plants, where they live and suck their juices. After a time the leaves perish, the plant is injured, and ultimately dies. The conditions generally favourable to the increase of these pests are dryness of the atmosphere with scorching suns. In our plant-houses we generally keep down the mites by ensuring a humid atmosphere, but in July it is difficult with us to grow melons in our district, on account of the number of these creatures which take possession of our frames.

Of late years I have used with good success open pans of water to evaporate and moisten the air, and by gently syringing the frame with warm water before closing it for the night, water is also supplied to the air. Plants cannot be cultivated if plant mites are not destroyed.

The different species of mite demand the attention of naturalists. Not only do they attack the plants in our glass-houses, but I have seen an extensive plantation of gooseberry-trees belonging to a market gardener at Fulham attacked by them, and the last year or two the plants of the British Queen strawberry have been destroyed at my garden by a visitation of plant mites. The common Red Spider is called *Gamasus telarius* (fig. 1011).

One acarus delights to live amongst microscopic fungi, and under the microscope looks like a rhinoceros trotting about in a jungle.

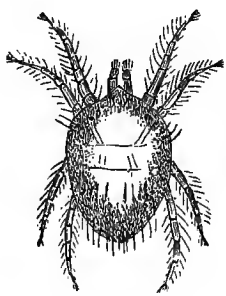


FIG. 1011.—Red Spider, magnified.

FIG. 1012.—Harvest Bug, magnified.

Koch has published a work upon these creatures, with a vast number of illustrations, but very few persons in this country are acquainted with the specific differences of the plant acari.

Kükenmeister considers the Harvest Bug (*Leptus autumnalis*, fig. 1012) to be one of the grass mites. He states that it lives in dry grass, in corn, and upon the gooseberry bushes, and also upon man in July and the beginning of August. It is very troublesome to reapers. I have not myself verified the species, but have engraved the figure from Kükenmeister. On my own gooseberry-bushes the acari have not appeared, or at any rate have never been observed, although the trees have been examined for that purpose.

SPIDERS.

Blackwall, in his valuable work on Spiders, has taught us how numerous are the British spiders.

> "The spider spreads her webs, whether she be
> In poet's tower, cellar, or barn, or tree."—SHELLEY.

The common Garden Spider (*Epeira diadema*, fig. 1013) delights us with the perfect geometric web which it constructs. It does a limited amount of good by destroying flies, but not to such an extent as to be really important. In our glass-houses we have a considerable number of the *Agelena labyrintheca*, which constructs a large sheet of web (fig. 1014), at one corner of which it makes a circular den; into this it retires and watches for its victim, upon which it pounces, carrying it to the den to be devoured. It looks altogether a most infernal apparatus.

FIG. 1013.—Garden Spider enlarged.

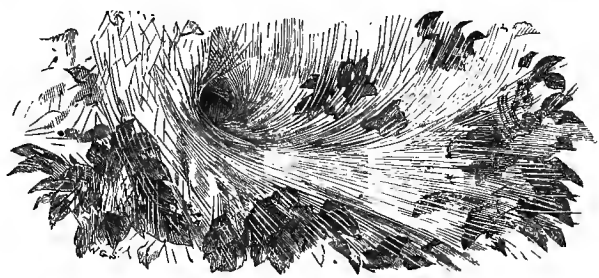


FIG. 1014.—Web of Agelena labyrintheca.

In the spring we often see a Red Spider (*Trombidium Holovericum*), which attracts our attention from the brightness of its colours; and also Hunting Spiders, which are remarkable for their extreme activity.

We sometimes see the Gossamer at Wallington, but not to be compared with the quantity which may be observed on the Continent in the autumn.

> "Slow through the air
> Gossamer floats, or stretch'd from blade to blade
> The wavy network whitens all the field."—GILBERT WHITE.

All spiders are useful to the gardener, but certainly could not of themselves entirely protect the garden from the ravages of insects.

CENTIPEDES AND MILLIPEDES.

We often notice Centipedes and Millipedes, especially about our potatoes and carrots. We have the Thirty-foot Centipede (*Lithobius forficatus*, fig. 1015, No. 2), which has a large head (fig. 1015, No. 3) and a powerful pair of jaws; but I do not remember to have ever seen at my garden the Luminous Centipede (*Geophilus longicornis*, fig. 1015, No. 1), which is remarkable at certain times for leaving a train of fire in its track. I have seen this phenomenon in London and in its vicinity, and have caught the creature surrounded by its fire.

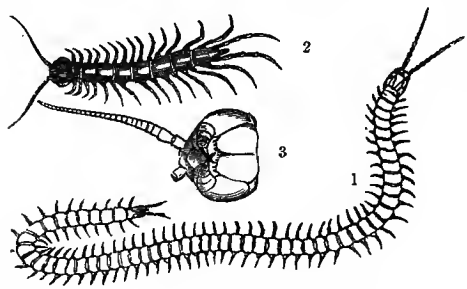


FIG. 1015.—Centipedes.

Many Millipedes abound in the garden, but I have not identified all of them. I have borrowed the picture from Curtis; it shows species which we may expect to find. No. 1, fig. 1016, represents *Julus Londinensis;* it has about 160 legs. Nos. 2 and 3 represent *Blaniulus guttatus*, which has about 170 legs, and is about half an inch long. No. 4 represents *Julus terrestris*, or Earth Snake Millipede, No. 5 showing its antenna magnified. Nos. 6 and 7 show the *Polydesmus complanatus*, or Flattened Millipede. I am by no means certain as to the functions these creatures perform in the general scheme of nature, although we see so many of them in the garden. Boisduval states that *L. forficatus* is a friend to the gardener, but further study is required to make ourselves acquainted with the natural history of these creatures. Koch has given figures of numerous species.

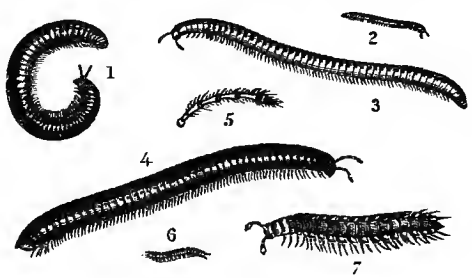


FIG. 1016.—Millipedes.

THE GARDEN INSECTS.

"Heat and cold, and wind and steam,
Moisture and drought, mice, worms, and swarming flies
Minute as dust, and numberless, oft work
Dire disappointment, that admits no cure,
And which no care can obviate."—COWPER.

However perfect a garden a horticulturist may have; however well stocked it may be with the most delicious fruits, with the most beautiful flowers, and with the choicest vegetals; however judicious may be the arrangements of his greenhouses and of his horticultural appliances; yet if the gardener be not acquainted with the habits of the insects which dwell therein, and if he does not know what to protect and what to destroy, his labour will frequently be lost, and he will be unable to assign any reason for his failure.

Many a time have I seen a crop of melons and cucumbers destroyed by aphides feeding unobserved on the under surface of the leaves; many a time have I seen crops destroyed by red spiders, and as often have I known the coccus, when unrestrained, to kill plants.

Sometimes the grub of the cockchafer or of the wireworm has been the offender in killing a plant by eating the roots. Sometimes grubs live between the two layers of the leaf, others eat its soft parts, and at other times greedy caterpillars devour the entire plant in a succulent state.

Again, large trees are destroyed by the formidable caterpillar of the goat moth, which perforates their trunks in all directions; and the larvæ of beetles inflict great damage by devouring the new-forming wood.

As a rule, gardeners do not grapple with insect pests sufficiently early, and the master should be quick to detect insect ravages and bring them under the notice of his gardener, so that he may adopt whatever measures may be practicable to prevent mischief.

Above all, both master and gardener should know what to destroy and what to preserve; for lady-birds, the most useful of all insects, have been killed as noxious, and ichneumons, the caterpillar-destroying help-

mates of the gardener, have frequently been destroyed upon the erroneous supposition that they were hurtful.

The number of kinds of insects which visit my garden is so vast that it would be impossible to describe them, even if they were all correctly named and classified by the scientific entomologist; but as all the insects of Great Britain are not up to the present time so arranged, the gardener must content himself with obtaining a general knowledge of the chief groups, distinguishing between those which are useful, detrimental, or onamental.

"By myriads, forth at once,
Swarming they pour; of all the varied hues
Their beauty-beaming parent can disclose.
Ten thousand forms! ten thousand different tribes!
People the blaze."—THOMSON'S *Seasons*.

HYMENOPTERA.

The first great class of insects to which I must call attention is the Hymenoptera, or Membranous-winged insects, such as bees, wasps, and ichneumons. The perfect insect has four veined wings for flight, it has jaws at the mouth, and at the tail either a piercer or a sting. The larvæ of some species resemble maggots, as those of the wasp; the larvæ of others resemble caterpillars, as those of the saw-flies.

This class comprises some of the most useful, as well as some of the most destructive insects which dwell in the garden. The most important insect in my garden is probably the Honey Bee (*Apis mellifica*, fig. 1017), which is directly useful to the horticulturist in setting the flowers by bringing the pollen of the pistils in contact with the stamens. No one who values a crop of fruit ought to be without his bees, which should be regarded as a necessary part of his establishment, and kept for the express purpose of setting his flowers, without any ulterior motive as to their production of honey. I always keep three or four hives for this purpose alone. The honey made by our bees in some years tastes so strongly of lavender and peppermint as to impart to it the flavour of physic.

FIG 1017.—Working Honey Bee.

De Candolle found that Narbonne honey owes its peculiar flavour to the fact that the bees feed upon rosemary flowers. Bees are particularly fond of alpine flowers, and delight to visit the sedums. Heather also yields much honey to bees, and beekeepers in Yorkshire carry their hives in a waggon to the moors when the heather blossoms, and return with them to their residence when it is out of flower.

The hum of bees is exciting to the nervous system of some persons. Gilbert White describes a boy who was a very Merops Apiaster. I have known such a case, in a gentleman who is now an officer in the army and passionately fond of music, who when a child was always in search of bees, and generally had some in paper boxes in his pocket.

It is not a fitting place to consider the economy of a bee-hive, or we should be led with Shakspeare to say :—

> "So work the honey bees :
> Creatures that by a rule of nature teach
> The art of order to a peopled kingdom."
>
> SHAKSPEARE, *Henry IV.*

At my garden the working bees (fig. 1017) kill the drones about the third week in August, when the ground around the hives is literally covered with their dead bodies.

The Humble-bees (*Bombus terrestis*, No. 1 ; *Bombus lucorum*, No. 4, fig. 1018) are of service to us, and it is interesting to observe them open the valve of the flower of the snapdragon and enter therein. Curtis states that these bees damage the flower by piercing it instead of entering at its mouth. Although we have abundance of snapdragons and numerous humble-bees, this observation has not been verified in my garden.

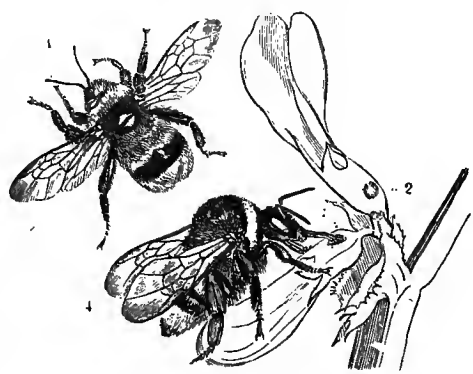


FIG. 1018.—Humble-bees.

In our neighbourhood there are many solitary bees, which make holes in a sand-bank, in which they deposit their young.

The Common Wasp (*Vespa vulgaris*, fig. 1019, *a*) constantly has its nest in our garden. In the year 1869 some epidemic disease appeared to attack them, which greatly reduced their numbers. Wasps are upon the whole very destructive in gardens, as they eat the thin-skinned apples, the finer pears, and the wall fruit, together with the plums and grapes. They are besides annoying and spiteful, as I have been deliberately stung by a wasp without the least provocation upon my part: for these reasons we destroy wasps by catching the large females, which appear in early spring. When the nests are discovered, in July and August, they are usually destroyed by making a squib of sulphur and gunpowder, which is introduced into the entrance of the nests; after which the nest, which is then full of grubs, may be dug out, and the grubs given to the poultry or be used as bait for fish. Tar poured into the entrance-hole is destructive to a whole colony, as no wasp can enter or emerge without being caught by this substance. Wasps may also be trapped by placing sugar and water in a bottle; being attracted by the sugar, they enter the bottle, but cannot escape from it. Wasps may be poisoned by arsenic and sugar, but pets are liable to be killed as well as wasps, and therefore this poison had better be avoided. Wasps are not altogether an unmitigated evil in a garden, as they act as scavengers to remove decaying animal matter, and they also destroy aphides. The nest of the wasp is very curious, being constructed of paper made by the creatures from the fibre of trees. It consists of a series of horizontal groups of hexagonal paper cells, arranged in tiers one cell thick, with the mouth downwards and one tier above another. The nest of the wasp therefore

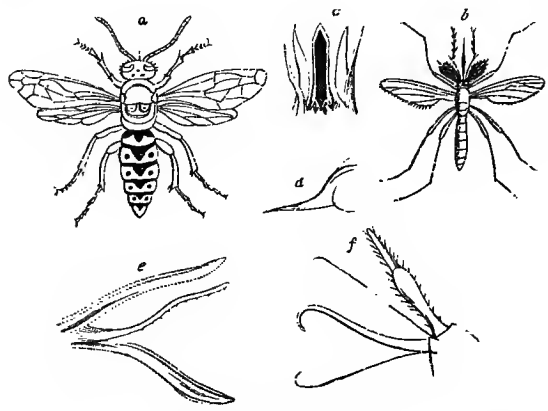


FIG. 1019.—*a*, Common Wasp; *a*, *e*, *f*, sting of ditto. *b*, Gnat; *c*, mouth of ditto.

forms a striking contrast with that of the honey bee, which is made of wax instead of paper, and the cells of which are arranged vertically in tiers two cells thick.

Dr. Ormerod takes a great delight in wasps, which have been his companions for many years. I have copied one of his figures of the common wasp's nest (fig. 1020), in preference to giving a figure from one of the specimens in my own collection. The late Dr. Henslow, the learned Professor of Botany at Cambridge, also delighted in the observation of these creatures, and forwarded many remarkable specimens to the Kew Museum.

FIG. 1020.—Wasp's Nest.

Wasps, like all other hymenopterous insects, sting with an apparatus placed at the tail (fig. 1019, *d*, *e*, *f*), while two-winged insects bite with an apparatus situated at the mouth (fig. 1019, *c*). When any person is stung by a wasp, we at once apply a drop or two of hartshorn; this is an infallible remedy, which immediately does its work. For this reason no gardener should be without a bottle of ammonia, or, as it is popularly called, hartshorn, during the fruit season. Ammonia is equally effective if applied immediately to the stings of bees, or to the bites of adders. Wasps sometimes attack the beehives, which has been noticed by Shakspeare:—

> "Injurious wasps! to feed on such sweet honey,
> And kill the bees, that yield it, with your stings."

Hornets (*Vespa crabro*) visit my garden, but I do not know where their nest is situated. They construct their nests in horizontal tiers, like wasps, and generally in the holes of trees. Hornets are larger, heavier, and more sluggish than wasps, and not so spiteful. On one occasion we had a hornet's nest in the eaves of a house in which we lived, but not a single inmate was stung; on another occasion a nest existed opposite the front door; and Dr. Ormerod mentions the case of a countrywoman who patronized hornets because they rid her room of flies, whilst she was confined to bed. The presence of a hornet in a room may always be

known, and we often discover one even in the centre of London, by the tone of the buzz, which is much deeper than that of the common wasp. The nest I have figured (fig. 1021) is taken from my work entitled "Instinct and Reason," and the original nest belongs to the British Museum. The Pendulous Wasp is also found on trees near Croydon.

After bees, which are so directly beneficial to vegetation, and after wasps, which are more or less injurious, we have among the Hymenoptera the whole tribe of Ichneumons. These flies are indirectly of great utility to the gardener, by destroying noxious insects. Some of

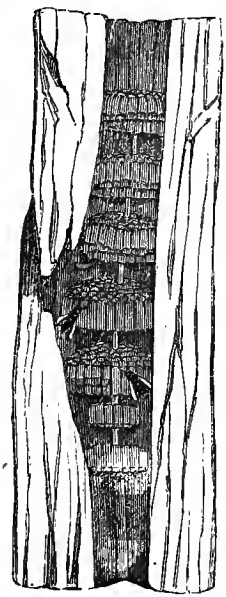


FIG. 1021.—Hornet's Nest (British Museum).

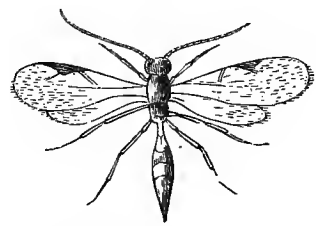


FIG. 1022. Aphidius rapæ (magnified 10 diam.).

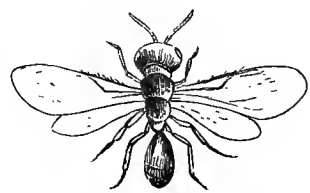


FIG. 1023.—Colax dispar (magnified 10 diam.).

them are large (fig. 1064, No. 5), and deposit their eggs in the largest caterpillars, while others are so minute, as the *Aphidius rapæ* (fig. 1022), that they can deposit their ova in the smallest aphides. The creature in which the egg is deposited is eventually eaten up, and instead of changing into a winged creature forms a case from which issues a perfect ichneumon fly.

Again, there are some species which deposit their egg in the larvæ of the ichneumons, which are preying upon a third creature; a truly

curious phenomenon of nature. This parasite upon parasite is exemplified by the *Colax dispar* (fig. 1023).

It is impossible to overrate the importance of the great family of Ichneumonidæ to the horticulturist. These winged insects deposit their eggs, some in the caterpillar, others in the chrysalis. They then turn into grubs, and devour the creatures in which they live, and thus are good friends to the gardener by destroying his foes.

In my work on the Potato plant I have mentioned that there is a set of hymenopterous insects which seize upon aphides and carry them off to their habitation to feed their own young ones. The *Pemphredon unicolor* (fig. 1024) is an example of this tribe.

FIG. 1024.—Pemphredon unicolor (magnified 3 diam.).

The Saw-flies constitute another group of hymenopterous insects injurious to the garden. Their larvæ resemble caterpillars, and destroy the leaves of many plants. The larvæ of Horn Tails bore the trunks of timber trees. At my garden for several years, and especially in 1871, we have been much troubled with the Rose Saw-fly (*Hylotoma rosæ*, fig. 1025). It devours the leaf of the rose-tree, leaving one membrane of the leaf only. It appeared in such quantities in some parts of the garden that every leaf on many trees was utterly destroyed at midsummer. The *Tenthredo rosarum* (fig. 1026) is represented by Boisduval to be very destructive to the rose; and the Pear-tree Saw-fly (fig. 1026*a*) sometimes inflicts much injury.

FIG. 1025.—Rose-leaf and Larva of Rose Saw-fly.

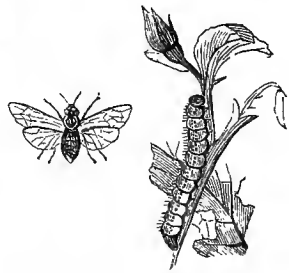


FIG. 1026.—Tenthredo rosarum, magnified.

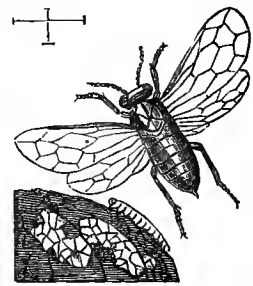


FIG. 1026*a*.—Pear-tree Saw-fly.

The larva of the genus Sirex, *S. juvencus*, has powerful mandibles,

by which it can pierce the trunks of pine-trees, and it has been known to gnaw through leaden bullets. I have not seen it in my garden, though in other places it has been known to be highly destructive. The figure is from the excellent book of Kölliker, translated by Westwood, and represents *S. gigas* (fig. 1027).

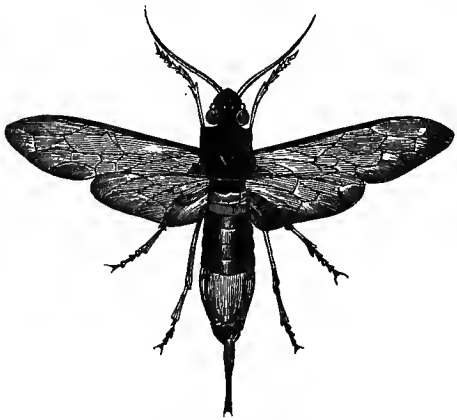


FIG. 1027.—Sirex gigas.

Gall-insects are another extensive section of the Hymenoptera. The species which develops the nutgall (*Cynips liquicola*, fig. 1028), which is used in the manufacture of writing ink, has within the last fifteen years spread throughout England, and exists in my garden, especially in the lower branches of the oak, or on the low oak bushes. The oak-apple (*C. terminalis*, fig. 1028*a*) carried by some good people on King Charles's Day (the 29th of May) is caused by the larvæ of another

FIG. 1028.—Gall on Oak.

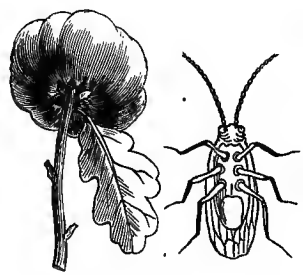


FIG. 1028*a*.—Cynips terminalis.

FIG. 1029.—Redbreast's Pincushion.

hymenopterous gall-insect; whilst the mossy excrescence on the rose (*Rhoditis roseæ*, fig. 1029) is another example of the effects of this section of hymenopterous insects. All these excrescences are detrimental to the plant on which they live, and should be removed.

Ants exist in my garden, but they do us little or no harm, although they sometimes locate themselves in our glass-houses. There are species

and especially a black one, which are constant attendants upon aphides, and feed upon the sugar which they excrete. Wherever ants run over a plant, there aphides or cocci exist. The Black Ant (fig. 1030) is so easily seen, and so readily guides us to a knowledge of the existence of aphides, that in familiar language I always call it my "aphis pointer," and no gardener should ever neglect the warning of the busy little black ant.

FIG. 1030.—Black Ant, nat. size and magnified.

BEETLES, OR COLEOPTERA.

In the division of insects, the second great class are the Coleoptera, or Beetles, some of which are useful, whilst others are highly detrimental and destructive to vegetation. Coleopterous insects have two thick horny coverings to the two filmy wings, which are folded. The larvæ of beetles are grubs having six tiny legs, of which a mealworm or wire-worm may serve as an example; these come from eggs, hatch to larvæ, which change to pupæ, and they in their turn are transformed into the perfect creature.

The largest beetle we have in England is the Stag Beetle (*Lucanus cervus*, pl. 24, fig. 8). It is so common that once, when some were wanted for a comparative anatomist, a *reward* of twopence a head was offered for them, but they were delivered in such quantities that it was very soon found necessary to withdraw the reward. The larvæ feed on wood in a state of incipient decay, and certainly they may be regarded as more ornamental than useful as they fly across the garden in a summer's evening.

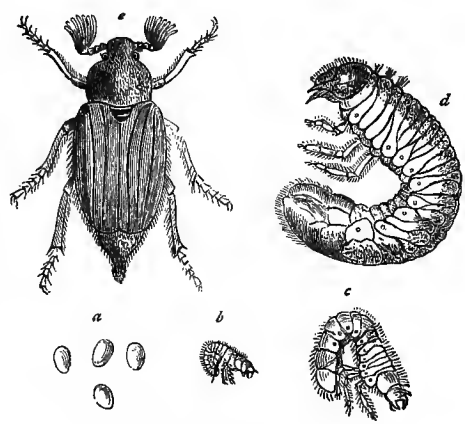


FIG. 1031.—Cockchafer: *a*, eggs; *b*, *c*, *d*, larvæ *e*, perfect beetle.

One of the most destructive insects to a garden, both in the larva and perfect state, is the Cockchafer (*Melolontha vulgaris*, fig. 1031). In

the grub state it eats the roots, and in the winged or perfect state it devours the leaves of plants, so that, when plentiful, what the grub leaves the cockchafer devours. This creature sometimes appears in such numbers as to constitute a plague, destroying all vegetation before it. I have myself seen the roots of grass so destroyed by the grub that the turf could have been rolled up; and Kirby and Spence have recorded extraordinary instances of its voracity. It is supposed to be five years in the ground before it assumes the perfect form.

Like the common cockchafer, the small June Bug (*Phyllopertha horticula*) is common in my garden, and often very destructive.

The Rose Chafer (*Cetonia aurata*, fig. 1032) is of so brilliant a colour that really I do not think the garden perfect without a display of its lovely colours shining in the rose-bushes. Nevertheless they are bad gardeners; and although I tolerate them in small quantities, yet they are similar to cockchafers in their destructive propensities. No. 1 shows the perfect insect; No. 2 the grub, which resembles that of the cockchafer; No. 3 the cocoon; and No. 4 the pupa.

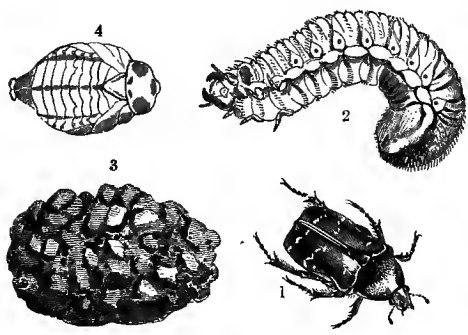


FIG. 1032.—Rose Chafer.

We have also the Dung Beetle (*Geotrapes stercorarius*), but, as I have observed elsewhere, not in large quantities. These beetles are of limited use as scavengers in burying the dung. They are constantly infected with a species of acarus.

> "To hear the drowsy dorr come brushing by
> With buzzing wing."—WHITE.

I have never noticed the Glow-worm (*Lampyris noctiluca*) in my garden, though in some years we frequently see it on Mitcham Common as we return in the evening to London. The light of this interesting creature is emitted from the two last segments of the tail. Glow-worms may be kept in a tumbler with a root of grass, for observation, and

should be covered with a bit of gauze : the creatures climb up the grass at night, and exhibit their light.

> "The glow-worm shows the matin to be near,
> And 'gins to pale his ineffectual fire."—SHAKSPEARE, *Hamlet.*
>
> "The chilling night-dews fall ; away ! retire !
> For, see, the glow-worm lights her amorous fire."—WHITE.

A tribe of beetles called Weevils, which comprise a large number of species, are detrimental to the garden. The larvæ are fleshy grubs without legs, and the beetles themselves have a long snout. One species, *Balaninus nucum* (fig. 1033), is in some years so numerous that every nut is destroyed. The egg is deposited in the young nut, when the grub eats up the kernel, and then bores a hole through the shell to escape; it hides itself throughout the winter, and emerges the next year as a perfect beetle. The figure shows the perfect beetle, and the grub eating its way through the shell.

FIG. 1033.—Balaninus nucum.

FIG. 1034.—Bruchus pisi.

FIG. 1035.—Scolytus destructor.

Another species of weevil, the *Bruchus pisi* (fig. 1034, *a*), destroys our peas. The larva (*b*) lives in the seed, and in some years seed peas (*c*) injured by it may be often seen in the shops.

The *Otiorhynchus sulcatus* is a common beetle, which has done much damage to ferns at the South Kensington Museum, and the *O. picipes* is said much to damage young trees.

Another genus of weevils, the *Scolytus*, is perhaps the most destructive of all beetles. The large elms for miles around London have been destroyed by the *Scolytus destructor*, the larvæ of which

(fig. 1035) live in countless multitudes upon the cambium under the outer bark.

The *Anthonomus pomorum* (fig. 1036) is another beetle which has a great influence upon the produce of the apple-trees. Its larvæ devour the pistils, stamens, and ovaries of the flowers in the month of May, and there are very few gardens where this pest is not found.

FIG. 1036.—Anthonomus pomorum.

I have smelt the Musk Beetle (*Aromia moschata*), the fragrant scent of which has been likened to a mixture of musk and attar of roses; but I have never seen a specimen in my garden. Some years ago, in the course of a single afternoon, I saw hundreds of musk beetles sunning themselves on the trunks of the willows growing on the side of the old Croydon canal, upon the site of which the railroad now runs.

My garden has been much infested with Wire-worms, the larvæ of various species of the Elateridæ. They especially frequent grass meadows, and as my garden was originally a grass meadow, I have been proportionally tormented by them. The larvæ are supposed to live five years underground before they assume the beetle form, and during the whole of that time they devour the roots of plants. Rooks are their great natural destroyers. I have found upwards of a hundred of these beetles in the crop of a rook shot in the early morning, before five o'clock. The gardener may trap them by placing slices of potato in the ground, round which they will congregate, and from which they may be taken and destroyed. Wire-worms are some of the very worst pests which the gardener has to extirpate. There are many species, but all are alike in the injury which they inflict upon the gardener. This extremely destructive creature is allied in its general charac-

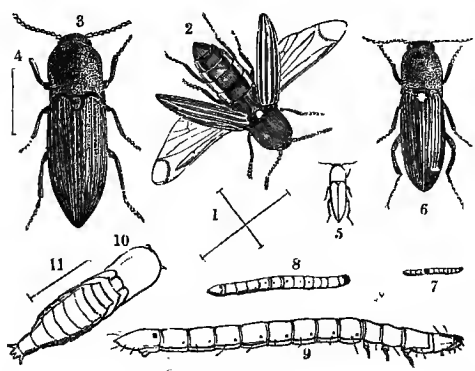


FIG. 1037.—Wire-worm.

teristics to the fire beetle of the tropics, which carries its two beautiful and curious lights in its thorax.

My figure is again taken, with the kind permission of Messrs. Blackie, from the great work of Curtis, "On Insects injurious to the Farmer." Fig. 1037, Nos. 7, 8, and 9, shows the wire-worm; the cylindrical form being a striking characteristic. They are stated to live in this condition for five years; they then assume the pupa form (No. 10), and Nos. 2, 3, and 6 show them, magnified, in the perfect state.

The Asparagus Beetle (*Crioceris asparagi*) is an example of a numerous genus, which sometimes is very injurious to the asparagus plants.

All gardens, and mine consequently included, are infested with a beetle minute in size, but of great importance on account of the damage which it effects. In common language it is called the Turnip Fly, or Turnip Flea (fig. 1038), but by the scientific entomologist it is designated as the *Altica nemorum*. The eggs (Nos. 4 and 5) are small; the maggots (Nos. 8 and 9) burrow in the leaf (No. 7); the cuticle then withers and dies (No. 6), and in about six days the maggots turn into chrysalises (Nos. 10 and 11, magnified), which in about two weeks change into minute beetles (No. 1, magnified), of the size represented (Nos. 2 and 3). The perfect insect, although so minute, is remarkable for its power of jumping at least eighteen inches. The turnip fly is so terribly destructive that, according to Curtis, the damage it did to the turnip crop in one year, in Devonshire alone, was estimated at 100,000*l*. In the garden many a crop of turnips, cabbages, cauliflowers, and other allied plants, is totally destroyed in the seed-bed. No certain mode of destroying this insect is yet known, but inactivity of the plants certainly leads to their injury, and a rapid growth as surely promotes their safety; hence it is of the utmost importance

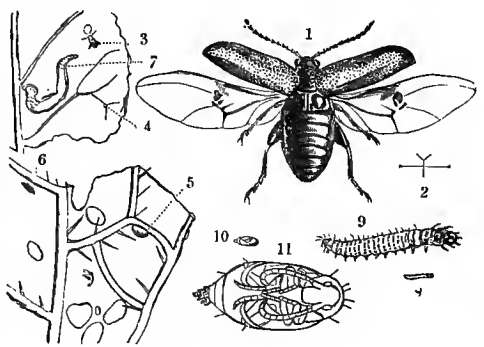


FIG. 1038.—Turnip Fly.

for the horticulturist to sow his seeds at a period of the year when vegetation is active. I have not myself watched these creatures minutely.

The Rove Beetles are very numerous, but are extremely repulsive to most persons, and are also excessively ferocious. They are, however, good friends to the gardener, as they devour earwigs and other creatures. The one figured is the *Staphylinus* (*Ocypus*) *olens* (fig. 1039), which is commonly called the Devil's Coach-horse. Curtis says that the larvæ (No. 1) are as ferocious as the beetle (No. 2), and feed entirely upon animal substances. There are no less than seven hundred British species; but the gardener who is thoroughly in earnest in mastering horticulture cannot afford the time necessary to make himself specially acquainted with each kind of beetle.

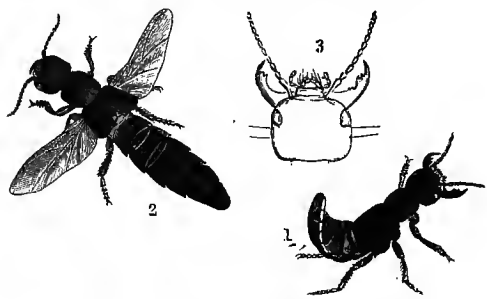


FIG. 1039.—Devil's Coach-horse: 1, larva; 2, beetle; 3, head magnified.

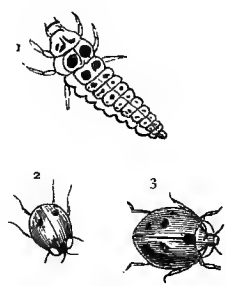


FIG. 1040.—Lady-bird.

One of the benevolent beetles which do us much service is that called the Lady-bird (fig. 1040) or the *Bête à la Vierge* (*Coccinellidæ*). There are many species of them; some having from two to twenty-two spots on their wing-cases. Both larvæ (No. 1) and winged beetles (Nos. 2 and 3) live upon aphides, and devour vast quantities of them. In seasons when the lady-birds increase in greater ratio than the aphides, as was the case in 1869, they devour all before them, and then migrate in vast armies to other parts. This is the origin of those great visitations of lady-birds which periodically occur. Whenever we meet with a lady-bird we place it in one of our glass-houses, and consider it a highly valuable ally; the rapidity with which it can clear plants of aphides is truly remarkable. Lady-birds in early spring are much prized by me.

The water in my garden contains a great many Water Beetles.

The *Dytiscus marginalis*, a great water beetle which abounds in ponds, does not appear to live in my garden; at any rate I have never seen it, though it exists in the grounds of Wallington House. The small water beetles are exceedingly numerous, and six or more of them may sometimes be found on a single stone under water in my Central brook, and many more may be descried on a piece of wood in the river. I believe that they are of no importance to the gardener.

ORTHOPTERA.

The Third order of insects are the Orthoptera, which comprise the Cockroaches, Crickets, and Grasshoppers. They have jaws, two opaque upper wings, and two larger thin wings. The larva, like that of the ordinary cockroach, has no wings. All these creatures are injurious.

The Cockroach (*Blatta orientalis*, fig. 1041) is a tropical insect, and loves the tropical temperature of our orchard-houses and cucumber-houses. We generally see this creature in the larva state, but really, when it has complete wings, it is far from being so ugly a creature as it is generally considered to be. It hides itself by day, and prowls about by night to devour what it can find. For the delicate shoots and fresh roots of orchids it has a particular fancy. These creatures may be poisoned by a mixture of red lead, treacle, and meal, or they may be trapped; but toads are their great destroyers, and therefore they should always be kept where cockroaches abound.

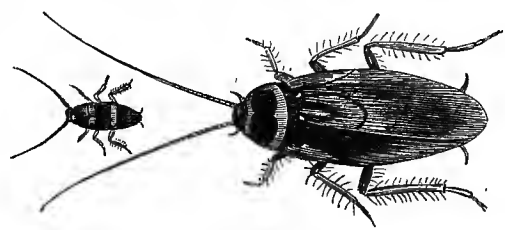


FIG. 1041.—Cockroach.

There is an extraordinary creature called the Mole Cricket (*Gryllotalpa vulgaris*), which is common in Hampshire. It has a powerful pair of fore-legs, formed like those of a mole, by means of which it burrows underground. A single specimen was found by the station-master at Hackbridge, and others have been placed in my field for observation, but do not appear to have bred.

Our plant-houses are visited by the Cricket, which sings us a cheerful tune in its own peculiar way, that is both exciting and pleasing to the mind. The horticulturist is irritated by the noise, as he knows full well that Mr. Cricket sups after his song, and perhaps selects the tenderest part of the choicest plant. Crickets on the hearth may be joyous enough, but crickets in the plant-houses are creatures of woe to the gardener. They may be poisoned like cockroaches, and they may be also devoured by toads.

> "And crickets sing at th' oven's mouth
> As the blither for their drouth."—SHAKSPEARE, *Pericles*.

Crickets like the warmest part of the plant-house, just as they frequent the crannies about the stove in the kitchen.

Out of doors Grasshoppers, of which there are perhaps twenty species, are destructive to the farmer. They are allied to the locust, and are equally destructive. In my garden we have but few.

FIG. 1042.—Earwig.

The Earwig (*Forficula auricularis*, fig. 1042) is another creature which is hurtful in gardens. They hide during the day, and come forth at night to feed upon fruit or the tender parts of flowers. They may be trapped by providing a dark hole, such as a scooped-out potato, in which they seek to hide.

HEMIPTERA.

The Fourth order of insects, the Hemiptera, is divided by some authors into Hemiptera and Homoptera, and comprises the Plant-lice and the Mealy Bugs. They have a horny beak for suction, and the perfect insect has four beautiful wings. The larva is like the perfect insect, except that it has no wings. The whole order is the terror of the gardener, as they live by sucking the juices of his plants, and much of his success will depend upon the promptness and vigilance with which he extirpates these pests.

The *Lygus solani* (fig. 1043, Nos. 2 and 3 magnified, No. 1 nat. size) lives on the potato leaf; and the *Lygus umbellatarum* (fig. 1043, Nos. 4 and 5 natural size, and No. 6 magnified) lives on the Umbellatæ.

The *Pentatoma oleaceum* (fig. 1044) is another plant-destroying insect, which is often noticed on vegetals.

The family of Aphides is injurious to the gardener. Some live upon the leaves of plants, and suck their juices. Other kinds, as the Oak Aphis, live on the trunks of trees, which they pierce, and suck their juices. Some live upon the tops of young shoots, as the Rose

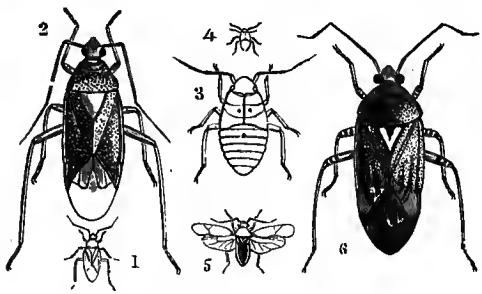


FIG. 1043.—Lygus solani and Lygus umbellatarum.

FIG. 1044.—Pentatoma oleaceum.

Aphis; and others feed underground, and suck the roots of plants, as one species which infest the lettuce. When aphides attack a plant, it has a tendency to rot at the roots, and I have even known large willow-trees to die down and rot after a severe attack by aphides. Gardeners are generally too tardy in the destruction of these creatures; the instant they appear they should be killed with tobacco smoke. Melon and cucumber plants frequently perish from the attacks of these creatures, as they remain unnoticed on the under surface of the leaves.

The aphis exists in three states,—the larva, the pupa, and the winged or perfect insect. It multiplies with extreme rapidity, and in the winged state frequently appears in vast clouds, filling the air and settling upon every object. Eggs are laid at the end of the year by some species, and I have hatched eggs experimentally in warm houses, to be sure that they were the eggs of aphides. It is a remarkable fact that the females propagate to an unknown extent without impregnation; and although I have kept myriads of the *Aphis vastator* for observation, I have never seen either an egg or a male. We are in the habit of looking to astronomy for numbers beyond the capacity of

man to realize, but the multiplication of aphides affords a more astounding illustration. A single aphis produces about ten every ten days, and these again give birth to ten; therefore to represent the number of the progeny of one of these creatures for the space of one year, thirty-six figures placed in a row would be required. As the distance in miles beween the earth and the sun is represented by only ten figures, and as seventeen figures would represent the number of aphides required to form a line between the same bodies, we may form a kind of indefinite vision of the immensity of the power of multiplication possessed by aphides, and have a dim idea of the rapid manner in which they can cover vegetation when they appear.

I have in my cabinet about 150 species, and I have traced a single species over sixty plants. Koch has given in his work 396 figures, and Boisduval has noticed 163 species. Nevertheless there is con-

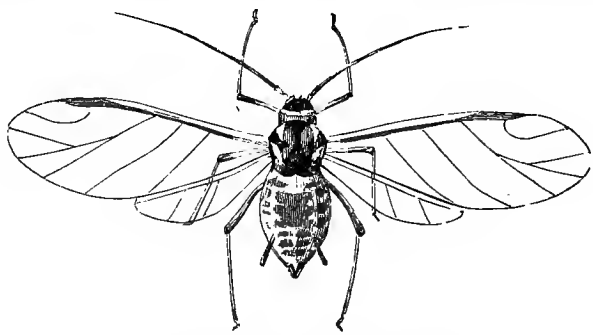


FIG. 1045.—Aphis vastator, highly magnified.

siderable confusion about many of the names. The one which I named *A. vastator* was called by Curtis *A. rapæ*, and both Mr. Curtis and myself considered that it was the same species. By some learned entomologists it was called, but I think wrongly, *A. rumicis*, and now some consider that it is *A. dianthi*. I have figured a drawing of one of my own specimens from the "Year-book of Facts" of 1850 (fig. 1045), *A. dianthi* in the larva state from a drawing kindly made for me by Mr. Buckton (fig. 1046), and the *A. rapæ* of Curtis (fig. 1047 : No. 5 the winged insect, No. 7 the larva, and No. 8 natural

size). I have also figured from Curtis the *A. floris rapæ* (fig. 1047: No. 1 the winged insect, No. 3 the larva, No. 4 natural size). The

FIG. 1046.—Aphis dianthi, magnified.

FIG. 1046 *a*.—Lettuce-root Aphis.

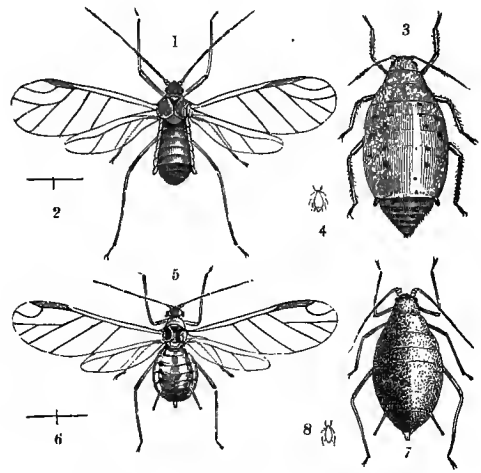


FIG. 1047.—A. rapæ and A. floris rapæ (Curtis).

A. vastator attacks a large number of plants, and is one of the most destructive pests which can annoy the gardener. It lives upon the under side of the leaves, and I have counted a hundred insects on a leaflet of the potato plant (fig. 1048).

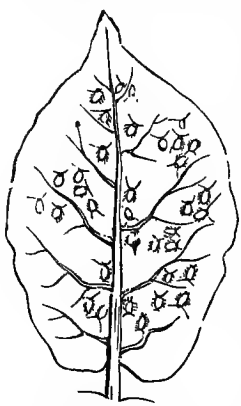


FIG. 1048.—Aphides on Potato-leaf, nat. size.

The Black Aphis (*A. rumicis*, fig. 1049) is considered to be *A. fabæ*, or Bean Aphis. It lives upon the stalks of the broad beans, near the top, and it is usual to cut off their top so as to destroy these creatures.

FIG. 1049.—Black Aphis, magnified.

Our plum-trees are terribly infested by the Plum Aphis (*Hyalopteris pruni*, fig. 1050). The under side of the leaves are sometimes so thickly covered with these creatures that the point of a pin cannot be inserted between them. They are of a peculiar light grass-green, and there are very few years in which they do not infest my trees.

Our peas are occasionally, but not often, attacked by the Pea Aphis (*Siphonophora pisi*, fig. 1051). In some years, in other localities,

I have seen it in large quantities, and one year a vast colony alighted in all the open courts of the Bank of England. It is a large handsome species, with long legs, long antennæ, and long joints to the legs.

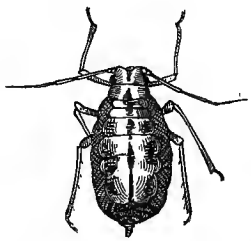


FIG. 1050.—Plum Aphis, magnified.

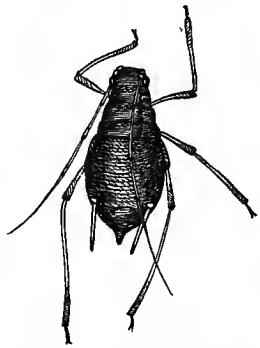


FIG. 1051.—Pea Aphis, magnified.

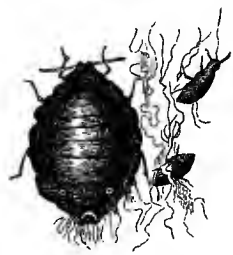


FIG. 1052.—American Blight, magnified.

One of the more remarkable aphides, which attacks two or three out of my large collection of apple-trees, is the American Blight (*Schizoneura lanuginosa*, fig. 1052). It lives upon the stems of the apple-trees, and when crushed stains linen like the cochineal: I remember it ever since I was a child, because I incurred the wrath of my nurse by staining my pinafores with its blood. It was supposed to have been imported from America, but Harris considers that it was introduced to America on fruit-trees from Europe. It is reputed to live on the roots as well as on the stems, but I have not myself verified this. It is very injurious to the trees.

FIG. 1053.—Currant-leaf with Aphides.

Some years, as in 1871, the currant-trees round London were severely injured by the Currant Aphis, which lives on the under side of the leaves and causes them to pucker (fig. 1053). In 1872 a second species attacked the tops of their shoots. Many of the trees died. Sometimes the lettuces are destroyed by a root-feeding aphis (*Ancyla fuscicornis*, fig. 1046 *a*). Frequently the leaves of the carrot are attacked by a species apt to escape notice. The vegetal marrows were attacked in 1871 for the first time in my garden, on the under

side of the leaf; but the melons and cucumbers in the glass structures are pretty constantly visited by this pest. Sometimes the leaves of our cabbage plants are infested, but never in my garden to such an extent as I have seen them elsewhere. I have noticed beet-root and mangold extensively destroyed, but not at my garden. Grasses have a peculiar aphis. Rose-trees are frequently injured by aphides, which attack the young shoots. In some gardens honeysuckles are constantly so severely attacked as to destroy their appearance, but mine have not so suffered. Ivy is sometimes seriously injured. The leaves of the apple-tree are often visited by a species totally different from the American Blight, but it has never been seen at my garden. The limes are constantly visited by such numbers that much honey is produced for the bees and wasps; the beech is also similarly infested. We have had two or three large willows killed by thousands of a very large kind of aphis, which Mr. Buckton has determined from my specimens to be the *Lachnus Saligna* (plate 23, figs. 1–3), although it may possibly be the *A. salicis* of Curtis, but not of Walker or Linnæus. The oak has several species, including the variety with long rostrum (fig. 1054), which lives in the cracks in the oak bark; and the sycamores have a very large species on their leaves, which is followed by a black fungus.

FIG. 1054.—Aphis Quercus, magnified.

I might cite many other examples, but I have mentioned enough to show how formidable these creatures are, from the variety of plants which they attack, and on account of the vast quantities which feed on a single plant. It is a desideratum to have good figures of all these creatures. I am well pleased that Mr. Buckton is undertaking this task, as an accurate drawing from nature of any natural object is a gift to the world, and a contribution to exact knowledge; for the pencil can delineate what the pen is unable to describe. Good drawings contribute much to compensate for the imperfection of words and language.

Allied to the plant-lice, and equally destructive, we have the Cocci,

of which the Cochineal insect, the coccus which lives on the cactus, is an example. Cocci are especially the plagues of greenhouses, and if allowed to multiply will speedily destroy a valuable collection.

These creatures, like the aphides or plant-lice, have a rostrum by means of which they pierce the cuticle of the plant and suck its juices. There are many species, but all are equally destructive. The vine is sometimes attacked by the Vine Scale Insect (*Coccus vitis*, fig. 1054*a*). The orange is pretty constantly attacked by the *C. hesperidum:* in fact, it requires continual care to keep this tree from their ravages. The pine-apple is attacked by the *C. Bromeliæ* (fig. 1054*b*). The Mealy Bug (*C. adonidum*, fig. 1055) is very troublesome in the hot-house. There is a group of these creatures which live under a shield, as the *Aspidiotus nerii*, or Oleander Scale Insect. In the year 1871, some of the lemons imported to London were spotted over with green, as though

FIG. 1054*a*.—Coccus vitis.

FIG. 1054*b*.—Coccus Bromeliæ.

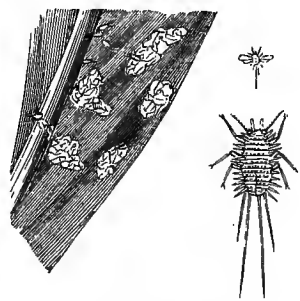


FIG. 1055.—Coccus adonidum, nat. size and magnified.

FIG. 1056.—Lemon coccus, magnified.

at certain parts they had not thoroughly ripened: in the centre of each of these spots there was a white covering, under which a coccus (fig. 1056) resided. The lemons attacked were bitter and unfit for use. The best plan to destroy cocci is to wash the plant.

Of late years a formidable creature, allied to the aphis and coccus, called the *Phylloxera*, has attacked the vine. It commenced in America, passed to Ireland, has visited the neighbourhood of London, and threatens most extensive damage in France. It has two forms—one which lives on the leaves and stems, and another which lives on the roots (plate 24, figs. 1—7.) Up to this time I have not seen this pest.

Thrips are another family of hemipterous insects which do much damage, from their great numbers. Mr. Haliday has made a special study of them, and has recorded his observations in the *Entomological Magazine.* There would appear to be a large number of species, as he has divided them into sixteen genera. At my garden, ferns kept in too warm an atmosphere specially suffer from their ravages. Tobacco smoke appears to kill them, but a remedy is to place the plant out of doors during the summer season. Fig. 1057 shows the larva thrips, and fig. 1058 the thrips in the mature or winged state.

FIG. 1057.—Larva Thrips, magnified.

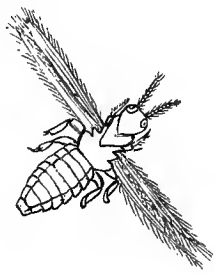


FIG. 1058.—Winged Thrips, magnified.

NEUROPTERA.

The Fifth order, Neuroptera, includes the Dragon-flies, Lace-wings, and May-flies. These have jaws, four netted wings, and have no sting. Most of the creatures comprised in this order are of service to the gardener, and some are useful as providing food for our trout.

We have but few of the larger Dragon-flies as compared, for instance, with the number which inhabit Epping Forest. It is highly interesting to watch them hawking for flies in the glades, and, when tired, fixing themselves upon the top of a branch to repose for the night. They are very voracious,and eat large quantities of flies.

We have not a great number of the small green Dragon-flies; nevertheless some are to be observed near the lake every year.

A very beautiful creature, called the *Chrysopa perla* (fig. 1059), with green gauze wings and sparkling eyes, is very useful to the gardener on account of the number of aphides it devours. The larva of this creature (fig. 1060) is to be found on nearly every infested leaf.

In a division of the order Neuroptera, and separated into the sub-order Tricoptera, we have creatures of some importance to us, as they afford abundant food for our trout. In the larva state (fig. 1060*a*) they

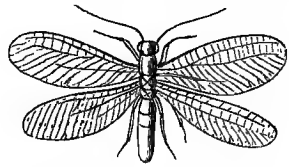


FIG. 1059.—Chrysopa perla.

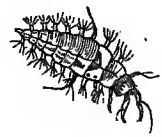


FIG. 1060.—Larva of C. perla.

live in the water, and are then called Caddis-worms; in the perfect state (fig. 1060*b*) they become winged creatures, and in both conditions are eagerly devoured by trout. In the larva state they live in a beautiful house, which they construct themselves of little bits of sticks, shells, or other materials, which they select according to the force of the stream in which they reside.

FIG. 1060*a*.—Caddis (

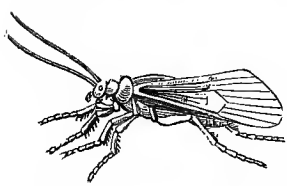


FIG. 1060*b*.—Caddis (perfect insect).

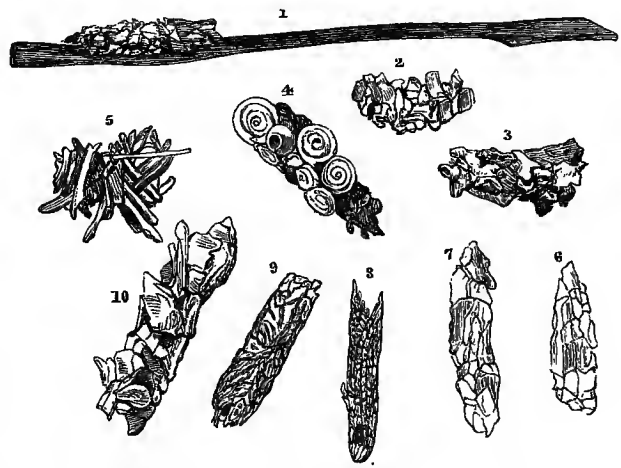


FIG. 1061.—Houses of Caddis-worms.

My daughter was so much interested in watching these creatures in their strange houses, as they moved along the bottom of the little streams, that a number were procured for more exact observation. The caddis-worms were turned out of their dwellings, and each was placed in a separate glass of water, with various materials suitable for the construction of their house, when the nude creature immediately set to work to make a new house (fig. 1061).

By giving to each creature one kind of material alone, they were unable to exercise any choice: hence Miss Smee was able to compel the creature to make houses of a considerable variety of objects. Beautiful cases were made of fragments of coloured glass amethyst, cairngorm, cornelian, agate, onyx, coral, marble, shells, and mother-of-pearl. When the little creatures were supplied with brass shavings or gold and silver leaf, they were sorely puzzled, and with the latter they could only make an irregular case. With coralline a pretty basket-like case was constructed. With fragments of a tortoise-shell comb one formed a case like a hedgehog. They were unable to make cases at all of round beads, although they have been known to use a cherry-stone. Neither could they succeed with slate, coal, brick lead, or copper; and if supplied with chips of resinous wood, the creatures were always destroyed.[1]

FIG. 1062.—Fossil Cadbaits (real size).

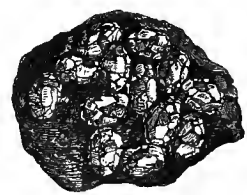


FIG. 1063.—Small Cadbaits.

At some former geological epoch these caddis-worms were so common, that in France hills are composed of their cases alone (fig. 1062). The winged insects fly over the water, and settle upon it.

> "To sunny waters some
> By fatal instinct fly; where on the pool
> They sportive wheel; or, sailing down the stream,
> Are snatch'd immediate by the quick-eyed trout."
>
> THOMSON'S *Seasons.*

We have a vast number of species of these water-flies. One little cadbait makes its case of small stones, and many may be seen in the Central brook attached to a single pebble (fig. 1063). It is remarkable however, that the true May-fly never appears on the Wandle.

[1] *Intellectual Observer*, No. 29, "On the Caddis-worm and its Houses."

LEPIDOPTERA.

The Sixth group comprises the Scale-covered winged insects, or Lepidoptera, such as Butterflies and Moths. The perfect insects have four wings covered with beautiful scales, arranged like the slates of a house. The larvæ are caterpillars, having six true legs and four or more pro-legs. In the perfect state the whole order are beautiful, and probably do the gardener much good by setting his flowers; but in the larva or caterpillar state all are more or less detrimental to the horticulturist.

"Luxurious, others make
The meads their choice, and visit every flower
And every latent herb."—THOMSON'S *Seasons*.

A great pest in the garden is the caterpillar of the White Butterfly (*Pieris brassicæ*), and that of *Pieris napi*, which live on the cabbages and cauliflowers, and which sometimes disgust us by being served up with these vegetals to the dinner-table. The female insect of *Pieris brassicæ* (fig. 1064, No. 1) has two large spots on the upper wings. She lays her eggs (No. 2) on various cruciferous garden plants, and on the turnip and horse-radish: the radish tuber, watercress, and especially the cabbage-stalk, are the prey of the caterpillar (No. 3), which attains the length of 1½ inches. The caterpillars assume the chrysalis form (No. 4), and may be found fixed by a silken thread on branches or palings, from which the butterfly emerges. Curtis states that the chrysalis is preyed upon by a minute hymenopterous insect, the *Pteromalus brassicæ*, and I have figured his drawing (fig. 1064, No. 5, and magnified No. 6).

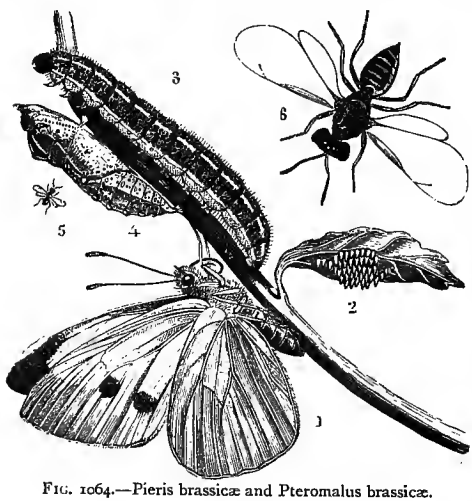


FIG. 1064.—Pieris brassicæ and Pteromalus brassicæ.

Hymenopterous insects are of great importance in destroying the caterpillar pests of the garden.

The Hawthorn Butterfly (*Pieris cratægi*) occasionally visits gardens, and, according to Boisduval, is at times troublesome in all parts of Europe, but if it has visited us it has not been observed. The caterpillar of the great Tortoiseshell Butterfly is also said to live upon cherry and plum trees, and sometimes it strips them entirely of their leaves:—

> "Là, tout papillon a des roses ;
> Tout corps laissé, des tapis verts :
> Toute abeille a des fleurs écloses ;
> Et tout zéphire, des concerts."—JULES CANONGE.

We are troubled to a certain extent with the tree-destroying Goat Moth (*Cossus ligniperda*). The caterpillar (fig. 1065) is a truly formidable

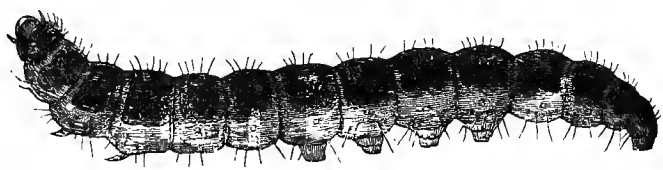


FIG. 1065.—Caterpillar of Goat Moth.

creature, with a pair of jaws of such power that it can eat and penetrate into the hardest trees. It lives upon the woody fibre, and is particularly partial to the willow. I have known it to destroy cherry and apple trees. Its presence may be known by an unpleasant odour, and by a peculiar kind of sawdust-looking matter oozing from the trunks of the trees. A short time ago I saw one of my favourite apple-trees so attacked. I immediately cut into this caterpillar's gallery, which I found penetrated to the heart of the tree. The moth itself is three inches across the wings, and is remarkable for the quantity of fat it contains, which is apt to grease the paper of the cabinet in which it is placed. Fig. 1066 shows part of the trunk of an apple-tree which was literally riddled by these creatures.

FIG. 1066.—Apple-stem eaten by Goat Moth.

The caterpillar of the Wood Leopard Moth (*Zeuzera æsculi*, fig. 1067) commits ravages similar to those of the goat moth, by boring into the trees.

An important caterpillar to the gardener is that of the Lackey Moth (*Bombyx neustria*). Some years it is common, though in others it is hardly seen. The moth (fig. 1063) lays its eggs (fig. 1069, No. 1), disposed in the form of a bracelet, round the branches of trees. The caterpillars (fig. 1069, No. 2) live in a spun web, from which they distribute themselves over the trees. On a warm day in June colonies

FIG. 1067.—Caterpillar of Wood Leopard Moth.

FIG. 1068.—Lackey Moth.

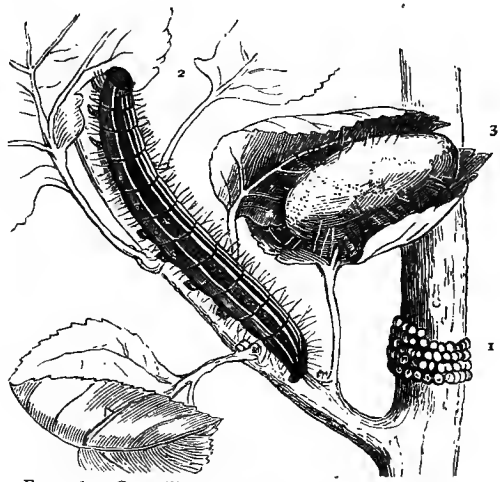


FIG. 1069.—Caterpillar, Eggs, and Cocoon of Lackey Moth.

congregate, two or three hundred together, on the sunny side of the stems of trees, to expose their bodies to the sun, when the gardener should take the opportunity of destroying them. The moths—even when the caterpillars have been plentiful—are not often seen. This species is allied to the silkworm, and, like it, spins a cocoon (fig. 1069, No. 3). Some years ago the caterpillars abounded on the pear-trees in the gardens north of London, and the last year or two they have been slightly troublesome in my garden.

The caterpillars of the Yellow-tail Moth (*Liparis auriflua*), of the Brown-tail Moth (*Liparis chrysorrhœa*, fig. 1070), and of the Gipsy Moth (*Liparis dispar*), are very destructive to the leaves of trees. The White Willow Moth (*Liparis salicis*), an imitation of the

perfect creature of which is used by fly-fishers to catch trout in the evening, is found in the garden.

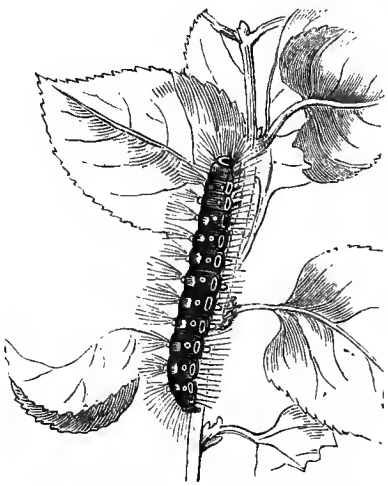


Fig. 1070.—Caterpillar of Brown-tail Moth.

The perfect male insect of the *Orgyia antiqua* is a winged moth, but the female has no wings. The caterpillars live upon fruit and rose-trees, and they sometimes exist in such numbers that they fall to the ground by hundreds.

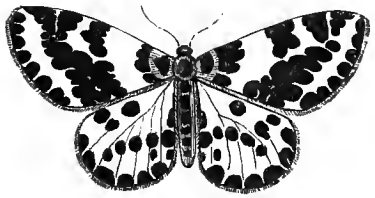


Fig. 1071.—Magpie Moth.

A very common insect in gardens is the large Magpie Moth (*Abraxas grossulariata*, fig. 1071). Sometimes the caterpillars utterly destroy all the leaves of the currant and gooseberry trees. The caterpillar forms curious loops, and has black spots down the back. In my garden it has fortunately never been at all numerous, but I have been informed that it may be destroyed by the powder of hellebore. The figure is from the excellent book on British Moths by Newman.

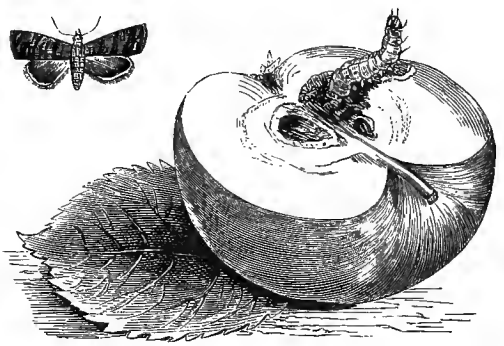


Fig. 1072.—Codlin Moth.

Our apples are at times injured by a caterpillar which lives in the interior of the fruit, and which causes it to ripen prematurely and to drop from the tree. The caterpillar then works its way out, when it undergoes its metamorphosis, and becomes changed into a small moth, the Codlin Moth (*Tortrix* (*carpocapsa*) *pomonana*, fig. 1072).

Many other Tortrices infest our gardens, the study of which must be left to the entomologist rather than pursued by the gardener. The *Tortrix pruniana* (fig. 1073) is an example of this class, which attacks the plum-trees.

FIG. 1073.—Tortrix pruniana.

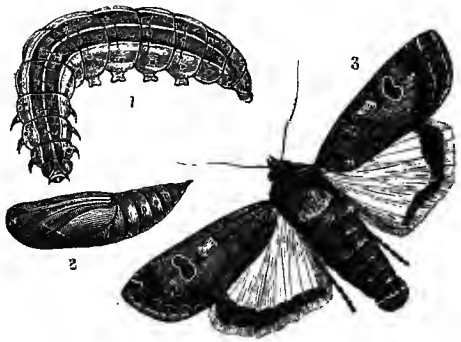


FIG. 1074.—Great Yellow Underwing.

The family of the Nocturidæ are so numerous that they have been again divided. The Great Yellow Underwing (*Tryphæna pronuba*, fig. 1074) is an abundant species, very troublesome to gardeners, devouring many kinds of plants—especially cabbages, cauliflowers, and lettuces. It is reported to live through winter, and to sally forth in spring to renew its devastations. The figure, after Curtis, shows the moth (No. 3), caterpillar (No. 1), and chrysalis (No. 2).

The caterpillar of the *Noctua* (*mamestra*) *brassicæ* (fig. 1075) is abundant everywhere, and hardly any garden produce comes amiss to it. It lives principally on cabbages and cauliflowers, and is a terrible pest to the gardener.

FIG. 1075.—Caterpillar of Noctua (mamestra) brassicæ.

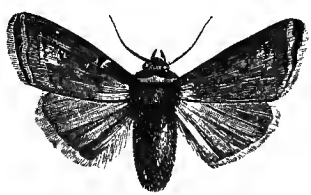


FIG. 1076.—N exclamationis.

The *Noctua* (*agrotis*) *exclamationis* (fig. 1076) and *N.* (*agrotis*) *segetum* also visit the garden.

Amongst the Geometers there is a very common moth, *Hybernia*

defoliaria, the caterpillar of which (fig. 1077) lives in a large number of forest and on most fruit trees. The caterpillar of this section of moths is remarkable for the curious form which it assumes in locomotion. The caterpillar is very destructive to the leaves in May, and enters the ground to change to the chrysalis in June.

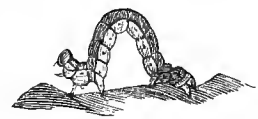


FIG. 1077.—Caterpillar of Hybernia defoliaria,

> "Thus are my blossoms blasted in the bud,
> And caterpillars eat my leaves away."
>
> SHAKSPEARE, *Henry VI.*

The hairy caterpillar of the Garden Tiger Moth (*Chelonia caja*) is very voracious, and devours the lettuces and strawberries. The moth is handsome, and the caterpillar characteristic, but in my garden it has never done material damage.

The Death's-head Moth (*Acherontia atropos*, plate 24, fig. 9) is not common in this country; nevertheless in the potato fields to the south of my garden many specimens have been found. The caterpillar may be known by its green colour, large size, and by a horn which it has at its tail. The moth itself is the most gigantic of our English Lepidoptera.

As a whole, my garden is not much infested with caterpillars. I attribute this to the protection which is afforded to the birds. When an entomologist, at my request, visited the garden on several occasions to assist me in determining the species which dwelt therein, he left in disgust, declaring that it was impossible to find insects where the birds were so numerous and so carefully preserved. *Lector, respice!*

DIPTERA.

The Seventh order comprises the Diptera, or Two-winged flies. The larvæ are maggots without feet, of which the gentle is a notable example. Some act as scavengers, and are thus useful to mankind others prey upon injurious insects, and so are of service. Many are themselves directly hurtful to vegetation; and a large number, as the gnat and mosquito, are the very terror of mankind in fenny countries.

The family of Syrphidæ is very beneficial to the gardener, from the extreme voracity of the larvæ, which devour aphides. The larvæ are constantly to be seen on leaves infested with aphides, when their mode of seizing and sucking those creatures may be often observed. *Scæva pyrastri*, engraved from Curtis (fig. 1078, No. 4), is a somewhat large fly, with great eyes. The maggots (No. 5) are green, and change into the pupa state (No. 6) before they become the perfect fly. No. 7 represents *Scæva ribesii*, and No. 1 the winged creature of *S. balteata*, No. 2 the maggot, and No. 3 the pupa.

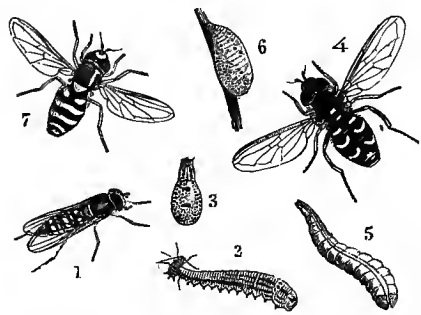


FIG. 1078.—Scæva balteata, S. pyrastri, and S. ribesii.

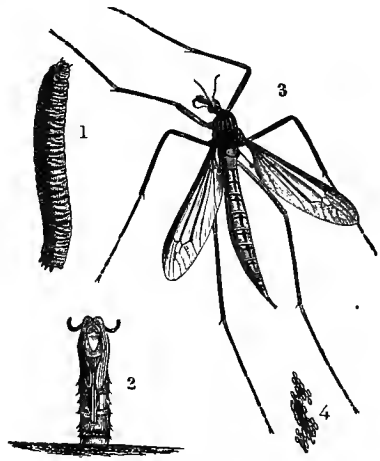


FIG. 1079.—Daddy Long-legs; 1, larva; 2, empty case; 3, perfect insect; 4, eggs.

There is a very destructive family of two-winged insects, called amiliarly Crane-flies or Daddy Long-legs (fig. 1079, No. 3), though scientifically termed Tipulæ. The larvæ are very destructive to many vegetals, and also to the roots of dahlias in the flower-garden. The larva of *T. oleracea* (No. 1) is a maggot about an inch long, in a thick jacket, but without feet. There are many species, of which I have figured one of the larger from Curtis, *T. paludosa*, as this will show to the horticulturist the character of these destructive creatures when they visit the garden. I believe the roots of our plants have been at times a good deal injured by the larvæ of Daddy Long-legs.

There are certain small insects of the same family which live in the fingers and toes of the malformed roots of cabbages, turnips, and

broccoli, and in all probability cause the plants to produce them. Fig 1080, No. 1, shows the small larva which lives in this deformity, No. 2 the same magnified; Nos. 3 and 4 represent the pupa, No. 5 the winged insect in repose, and No. 6 the creature in the act of flying.

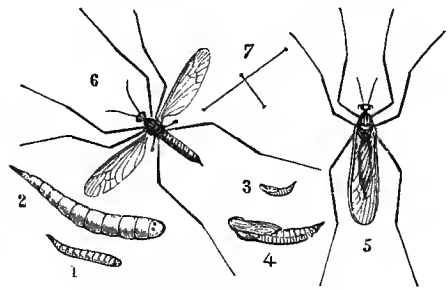


FIG. 1080.—Trichocera hiemalis.

There are other gnats which appear sometimes in little clouds; and in the hot summer of 1870 many mosquitoes, the bites of which were very severe, visited our neighbourhood, and probably located themselves on the Sewage ground. At my garden some species constantly come out at dusk, after the midges have tormented us in the day-time. Gnats, and all other dipterous insects, have no sting at their tails like wasps, but bite with their mouths (fig. 1019, *b*, *c*).

> "When the sun shines, let foolish gnats make sport,
> But creep in crannies, when he hides his beams."
>
> SHAKSPEARE, *Comedy of Errors.*

The celery and parsnip—but particularly the former—have been most seriously injured by the great Celery Fly (*Tephritis onopordinis*). The larvæ live between the surfaces of the leaf (fig. 1081), and then eat the

FIG. 1081.—Celery affected with leaf-mining Larvæ.

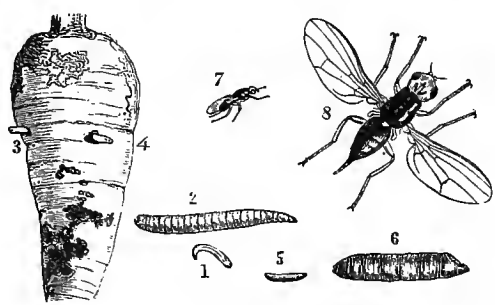


FIG. 1082.—Carrot Fly.

intermediate tissue, so that the leaf cannot perform its functions, and thus the whole plant is damaged and is liable to rot. The only remedy is to pluck off the diseased portion of the leaf.

The larvæ (fig. 1082, Nos. 1, 3, 4, and No. 2 magnified) of the Carrot Fly (*Psila rosæ*) prey upon the roots of the carrot, which they eat along, thus damaging its quality. It changes into a pupa (No. 5, and No. 6 magnified), and then into the perfect insect (No. 7, and No. 8 magnified).

In the environs of London the young pears have been much attacked by a small maggot (fig. 1083: A natural size, B magnified), which lives upon the fruit in the early stage. They appear to stimulate the growth of the young pear, which soon attains to a larger size than its neighbours, but only to promote its premature decay, as the pear drops about the last week in May. Sometimes all the pears on a tree are destroyed by this pest. I think the best plan to get rid of them, in small gardens, would be to collect and burn the overgrown pears the last week in May. This maggot has not yet attacked my garden so much as it has others.

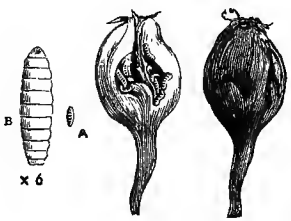


FIG. 1083.—Pear with Larvæ.

FIG. 1084.—Onion Fly.

Onions are sometimes destroyed by the Onion Fly (*Anthomyia ceparum*, fig. 1084). The eggs are deposited on the onion close to the earth, and the maggots eat their way to its heart. This fly has not, however, been noticed in my garden.

The larvæ of the Holly-fly (*Phytomyza ilicis*) eat the parenchyma of the leaves of the holly, as the larvæ of the celery-fly do the leaves of that plant.

> "For oft, engender'd by the hazy moth,
> Myriads on myriads, insect armies waft
> Keen in the poison'd breeze; and wasteful eat
> Through buds and bark, into the blacken'd core
> Their eager way."—THOMSON'S *Seasons*.

SLUGS AND SNAILS.

My garden, like all others, abounds in slugs and snails, which delight to eat the choicest and rarest plants, and therefore it is the duty of the gardener to exterminate them in those spots where only labour and watchfulness secure to us the pleasure of rearing beautiful and foreign plants.

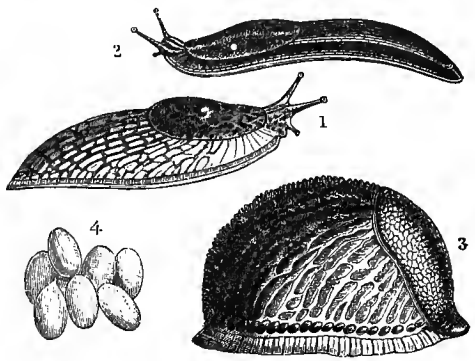


FIG. 1085.— Black Slug.

We have the *Limax agrestis*, or Milky Slug. Fig. 1085, No. 1, represents the *Arion ater*, or Black Slug, No. 2 the same whilst moving, and No. 3 when in repose. These creatures multiply by eggs (No. 4), and have greatly increased in number since I first took possession of my garden. They come out at night and in wet weather, when they should be caught by the gardener. The horns of slugs and snails appear to be highly sensitive, which has been well alluded to by our great poet when he says that—

> "Love's feeling is more soft and sensible
> Than are the tender horns of cockled snails."
>
> SHAKSPEARE, *Love's Labour's Lost.*

We have also abundance of the *Helix aspersa*, or common Garden Snail, of which the thrushes are so fond. The species is propagated by eggs (fig. 1086, No. 1), which hatch into small snails (No. 2), grow (No. 3), and finally attain the size of No. 4. They are fond of living in the crevices of walls, but as we have no walls we are not greatly troubled with them.

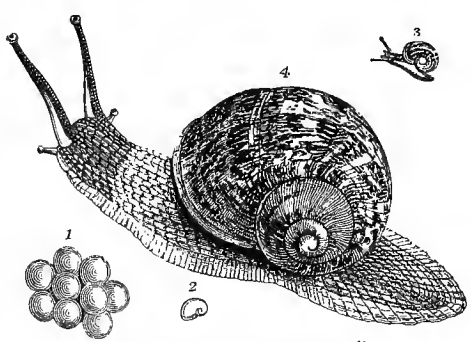


FIG. 1086.—Common Garden Snail.

On the chalk downs to the south of my garden, the large *Helix*

Pomatia (fig. 1087) is found in abundance, although it has not been seen within it. This is the eatable Roman snail, and by some persons is considered to have been an introduced species. It is the kind which I have seen in the snail gardens of Eastern Switzerland. I introduced a considerable number into the boundaries of my garden, but I cannot yet tell whether they will live in my district. I am informed that to this day the workmen of Didcot collect them from the chalk downs and eat them. This species, whether introduced or natural, is now abundant on all the chalk downs of England.

We have the variously marked Girdled Shell (*Helix nemoralis*, fig. 1088), but not in large quantities. The outward appearance of different specimens presents so much difference that I at first thought

FIG. 1087.—Helix Pomatia.

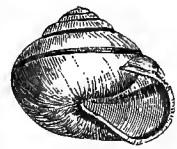


FIG. 1088.—Girdled Shell.

FIG. 1090.—Succinea putris.

FIG. 1089.—Zonites crystallinus.

FIG. 1091.—Limnæus Pereger.

there were several species, but Dr. Gray, the great authority, assured me they were all the same: one naturalist has given seventy-seven names to varieties of this species alone.

Of other Helicina, we have *Zonites lucidus*, a small species, and *Zonites crystallinus* (fig. 1089), which lives amongst moss and leaves. We have also *Helix cantiana*, or Kentish Snail, which lives in hedges in Kent and Surrey, and some other counties; *H. concinna*, or Neat Snail; and *Helix* or *Succinea putris* (fig. 1090), the common Amber Snail, which is abundant on the water iris in our lake, but of its natural history I know little.

In the water of the lake we have great abundance of Limnæi, particularly of *Limnæus Pereger* (fig. 1091) and *L. Stagnalis*. They

are of some importance, as they exist in great quantities, and form an article of food to our trout. I have seen the bottom of the Back-water literally covered with the dead shells, and I have known pints of shells to pass through the pipe used to supply our fish-hatching apparatus. The eggs may be seen in an aquarium on the glass, and the little creatures, when first hatching, are interesting objects. They can float upon the surface of the water as though that surface were a solid body to which they could attach themselves.

In our Central stream, particularly in the Fern glen, there are plenty of the common River Limpet (*Ancylus fluviatilis*, fig. 1092) adhering to the stones where a rapid current of water passes over them.

Amongst our water weeds we have many of the *Planorbis corneus*, or Horny Coil Shell, the *P. carinatus*, *P. complanatus*, *P. vortex* (fig. 1093), and *P. contortus*. These creatures are of considerable importance to us, affording food for the trout, and it is very amusing to see the fish with tails out of water in the evening diving amongst the water weeds to pick them out.

FIG. 1092. River Limpet.

FIG. 1093. Planorbis vortex.

FIG. 1094. Cyclas cornea.

FIG. 1095. Bithinia ventricosa.

FIG. 1096. Valvata piscinalis.

The *Cyclas cornea* (fig. 1094), if it does not exist in my garden, abounds in a turf-pit immediately outside in the grounds of Mr. Sheppey. It has a bivalve shell.

We have two Bithinias, *B. ventricosa* (fig. 1095) and *B. tentaculata*, both small creatures living in the water; and also *Valvata piscinalis* (fig. 1096), another small water snail.

I had a fancy to acclimatize the *Dreissena polymorpha*, a very curious creature introduced about fifty years ago into the Commercial Docks, and supposed to have come from the Danube. It exists in the reservoirs of the New River Company at Stoke Newington; but the specimens I placed in my water did not thrive, and I presume the trout devoured them, as sticklebacks were seen to do so when placed with specimens in a glass aquarium. Dr. J. E. Gray—from whom every English student

of Zoological Science has during a period of more than half a century obtained so much kind information and assistance whenever it was needed, and who has thus enhanced the value of our national collection at the British Museum—tells me that on the hills above us he has himself found five other species of shells, namely *H. pulchella*, *H. fasciolata*, *H. virgata*, *H. ericetorum*, and *H. umbilicata*.

MY FISHERY.

"Our plenteous streams a various race supply."—POPE.

We have but few species of fish in the Wandle as it passes through my garden, nevertheless the Trout and Eel make up in quality what is wanting in variety. The Wandle has always been celebrated for its fine Trout (*Salmo fario*, fig. 1097) and there are so many in the river that probably it can be favourably compared with any trout stream in Europe, as the quantity of fish it contains is only limited by the food

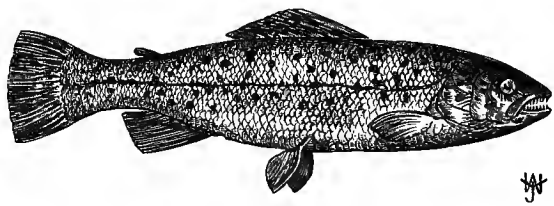


FIG. 1097.—Trout.

which it can afford them. The French Commissioners, when on a visit to this country, were astonished at the number of fish which they saw, and said it would be impossible in France to have a river so stocked, as their countrymen would never rest till they had caught them. I am afraid that Sir H. Davy magnified his piscatorial adventures in the Saltzkammergut, as I certainly could not see so many fish there, for an equal amount of water, as we possess.

Formerly we always considered that we had two varieties of trout in the Wandle,—one shorter, with white flesh, which is in season in May and June; a second longer, with large head but with red flesh, which comes into season in July and August.

At the present time we have several varieties, and Dr. Günther,

the distinguished ichthyologist, has pointed out in the Catalogue of the British Museum that there are not only outward, but structural differences amongst the trout in my water. He reports upon seven specimens, from 9½ to 14 inches long, taken from my garden in the month of March.

	Inches long.	Cæs. pyl.	Vertebræ.
Male	14	39	58
Female	13	41	57
Male	11	41	
Female	12	42	58
Female	10	47	
Male	9½	49	57
Male	12	51	

Dr. Günther adds: "It must be remembered that Mr. Smee has introduced into this river numerous trout artificially bred from ova which were received from numerous sources."

Mr. Reynolds, whose family have lived in the district for nearly a century, informs me that his grandfather placed some lake trout in the stream, and also another variety of yellow trout, but he could not remember whence the latter were procured. Mr. Reynolds notes three varieties in the stream, and he believes that the yellow variety was introduced from the Christchurch stream.

I have figured a large fish (fig. 1097) that was killed, with nearly a cartload of others, by something supposed to be gas refuse, which came down in the Croydon sewage.

The trout of the Wandle have ever held a high reputation for fine flavour; nevertheless I consider that the trout of the Darenth—which rises partially from the same chalk downs as the Wandle, and enters the Thames at Dartford—are even of better quality. Of late years the trout have deteriorated in quality. Mr. F. Gould has particularly noticed this. It arises probably from a diminution of the water in the Upper Wandle and from the influence of the Anacharis, which causes an accumulation of mud.

At my garden the trout do not live on fish, as they do in the Thames or Colne, where there are millions of young fry and minnows. Curiously enough, we have no minnows at all in our water: but in spring, when the trout are very active, they may be occasionally seen with another fish of their own species in their mouths.

In our water the trout spawn about the third week in January, and continue to do so till the end of February or the first few days of March. Below us, in the grounds of Shipley House, they are a few days earlier. After having spawned, the fish distribute themselves over the water, each taking up a station according to its fancy, where it is always to be found, unless indeed it is taking an excursion for food or for pleasure, when it returns again to the same place, so that each individual trout is perfectly well known to the frequenters of my garden. When a second trout seeks to secure a station already occupied, it is amusing to see the one in possession rush at the intruder with open mouth to chase it away. The trout at its station takes any food to its mouth which may float down the river, but sometimes it will not move a foot out of the way to secure a tempting morsel. If disturbed, it leisurely swims away a few yards ; and when all is again quiet, it returns to its old quarters. In our river the chief food of the trout is the planorbis and limnæus, the fresh-water shrimp, and the caddis-worm ; it also rises to the water-flies which settle on the water during the summer months ; but it is not very particular about its food, as it has been seen to pick a mutton-chop bone with as much relish as a dog would.

In the evening the trout wander up the streamlets searching for prey in places where there is scarcely water to cover them, and return with the velocity of lightning when disturbed.

Sometimes the trout attempt to hide themselves by thrusting their heads into holes in the bank, unconscious that their tails are sticking out and can be seen—a very dangerous position, as any person having an evil intent has only to put his hand quietly down to the hole and tickle the fish till the head be secured, when the trout can be thrown on the bank. This process is called trout tickling.

It is a wonderful sight to see the trout congregate to spawn on shallow gravel beds over which there is a sharp stream of water. Occasionally two or three trout go up one of the small streamlets and make a little spawn-bed for themselves, but as a rule where one goes all go, and so by their numbers they make a hill on the gravel of many cartloads in extent. At the tail of this hill there is always a little

pool. Great have been the disputes as to whether the trout throw up these gravel hills with their heads or with their tails: the head of the fish, however, shows much abrasion.

It was years before I could see the act of spawning performed with my own eyes, as apparently it is quickly done, and then possibly most commonly at night. However, one genial spring morning after a succession of cold nights, the fish gratified me by allowing me to see the operation. I then saw distinctly the male fish chasing the female on the spawn-bed, and the fish turning up the gravel at the tail of the spawn-bed with their noses. When all the spawning is finished, some of the male fish remain for two or more months at the tail of the spawn-bed, and, as they chase away all strangers, I believe that they are watchmen, playing the same part in the protection of the ova as the pugnacious male sticklebacks undoubtedly do with respect to their nests.

The artificial breeding of fish, or Pisciculture, has been followed more or less in this country for many years, and Mr. S. Gurney practised it on the Wandle at the Culvers. Mr. Sheppey was also successful; and the Wandle Fishing Association below the Culvers now raise about 15,000 trout annually.

The French Government, however, have of late years given an impetus to the industry, and Professor Coste, who had charge of the subject, used a gridiron of glass rods to support the ova in earthen vessels, over which he allowed a current of water to trickle. I first learnt his process at the College of France in 1859, and was highly delighted with the result. The Professor was so obliging as to give me specimens of young salmon and trout, which I brought to England, together with one of his boxes, in order that I might make known his process and use it in my garden, whence it has spread over the country.

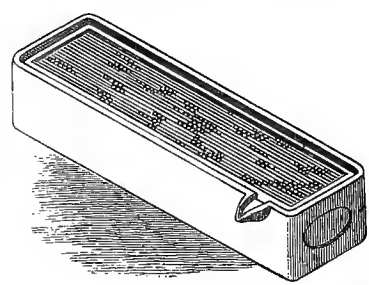


Fig. 1098.—Fish-tray.

The apparatus is simple. It consists of an earthenware oblong box (fig. 1098) about four inches deep, six inches wide, and fourteen inches long, with a little spout. Inside

this a wooden tray is supported about an inch below the surface; the bottom of this wooden tray being composed of glass rods about one-eighth of an inch apart. The breeding troughs are placed in a house of the simplest construction, roofed with reed hurdles (fig. 1099).

Fig. 1099.—Fish House.

A set of these boxes is so arranged one over the other that the spouts out of which the water runs are alternately right and left, so that the water in passing from one box to another runs entirely over the surface of the ova in each box. It is necessary that the current of water should be maintained for the entire time requisite for the development of the ova.

To procure ova, fish must be caught during the spawning season. The male fish are slimmer than the female. When ready for spawning the females emit ova on the slightest pressure, and the males emit milt. The ripe female is taken in the hand, and the spawn pressed out by drawing the hand slowly, firmly, but gently from the head to the vent; and care should be taken that every single egg is emitted from the fish, which can be told by the feel. The spawn should be received in an earthen vessel, as a basin, containing just sufficient water to cover it, and simultaneously the milt from a male fish should be mixed with the ova, which then become fertilized. I generally begin with the milt of a male, then proceed with the ova of a female, and then use the milt, when males and females are equally abundant. In the early part of the season ripe males are more abundant than ripe females, but at the end of the season the females will be found ready, whilst the males will be spent; and I have known a considerable difficulty in obtaining an adequate supply of milt.

The fertilized ova should be arranged on the glass gridirons in the hatching boxes. Each box holds about two thousand eggs, and no delay should ensue in causing the water to run over the ova.

If all goes on well, in a few days two little black specks are visible, which are the future eyes, and in due time the little fish breaks through the tough membrane which has invested it. At that period each little fish has a large bag attached to its stomach, which is called the umbilical vesicle; this is covered with bright blood-vessels, by which the material contained in the bag, which is destined to nourish the young fish, is gradually absorbed.

During the period required for hatching the eggs they should be examined at least twice a week, and every egg which turns opaque should be removed, or it is apt to be covered with a fungus (see Fungi, fig. 859). The time required for the development of the egg is six weeks, but it varies a little with the temperature, which it is always desirable to keep down. On a warm day hundreds of young trout will break through their covering, when they drop through the apertures between the glass rods to the bottom of the vessel.

During the whole time of hatching the ova, they should be kept nearly in the dark, for if exposed to the light the eggs become covered with a confervoid growth, which destroys them. I did not succeed well till I learnt this fact, but now there is no difficulty, and very little trouble, in obtaining any number of young fish. In a large hatch of ova there are always some double fish, or Siamese twins. These live till they lose the umbilical vesicle, when they die.

When the umbilical vesicle is absorbed, food must be taken by the mouth, and really at this period there is practically considerable difficulty, for they must be supplied with food, and that food must be in motion. It is supposed that they live on the entomostraca: they certainly do not live on the diatoms, as I have examined their stomachs to ascertain the fact. Fine scraped meat may be given to them, or very fine pounded liver, but I prefer at once to turn them loose. On every fine day after they have been placed in our streams the little fish may be seen in great activity, continually darting at something which no doubt is food, but which is too small for the human eye to distinguish. I turn them into little streamlets which I clear of all living things as far as possible, as a little trout is a dainty morsel, highly

prized by the miller's-thumb, stickleback, or even by a trout of larger dimensions.

When a number of small fish are thus turned out, they gradually seem to drop down the stream, and may be traced for some hundred yards. At the period of losing the umbilical vesicle the fish are delicate, and I have known as many as two thousand fine young salmon-trout die in a single night, from some cause which I could not satisfactorily explain.

When it is desired to feed trout artificially till they attain a large size, live fish are required. At Heidelberg, where there is a breeding establishment on a slender stream at the Wolfsgang, I saw great quantities of white fish, which were procured by netting the river Neckar below. The difficulty of obtaining a sufficient supply of such fish would prevent me from making trout-feeding a profitable business, as it appears to be at Heidelberg; for how could I possibly procure a constant and cheap supply of live minnows, bleak, dace, or other fish at my garden, where none now naturally exist? The kindness and courtesy of the officials at the Huningue establishment of France merit the warmest acknowledgments of pisciculturists, and I have to return them my thanks for many boxes of spawn. The practical success of this process is proved by the fact that many varieties of trout are now found in my water which did not exist in the Wandle before I supplied the river from ova sent to me by this establishment. It is understood amongst the proprietors of the Wandle that fly-fishing should alone be practised for catching trout. There are one or two pieces of waste water, however, where the fish are sadly poached. It is not usual to fish before the 1st of May or later than the end of August. In some years the fish are hardly fit to eat in May, and in others become so thin by the middle of August as to be unfit for food.

Fish out of season shrivel in cooking, are tasteless, and are sometimes actually poisonous, for which reason every black fish, when caught by a rod and line, should be returned to the river.

Every fisherman has his peculiar notions as to the size and colour of the flies he uses, and even of the number which he has on his line.

For myself, I use only one fly at a time on the Wandle. As a rule, a fly called a coachman (fig. 1100, No. 5) generally kills: it has white wings, and the size should be proportionate to the light, smaller flies being used in sunshine, larger in twilight, and at dusk a very large coachman may be tried.

Sometimes a fly the opposite of this, with dark blue wings, is good; but there is a particular time in June when the natural fly floats down the water, and then it is necessary that the artificial fly should do the same, if the fisherman desire fish. At all other times the artificial fly may float down the river a few inches below the surface.

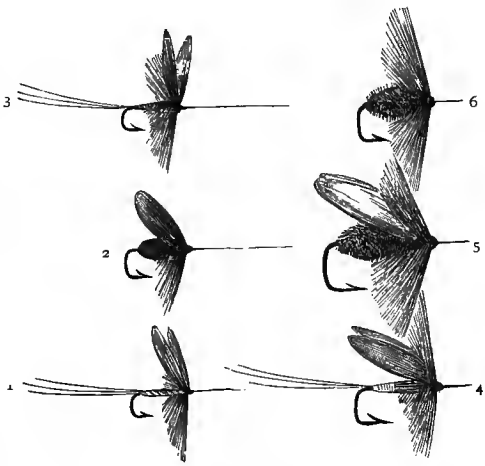


FIG. 1100.—Flies: 1, Quill Gnat; 2, Black Gnat; 3, Carshalton Cocktail; 4, Emperor; 5, Coachman; 6, Coch-y-bonddhu.

There are times, however, when fish will not feed, and nothing can induce them to feed, and this applies to all fresh-water fish, and also, as far as my limited experience goes, to salt-water fish. When there is no difference in the water itself, the desire for food by fish, as far as I can judge, depends upon the qualities of the light; and trout, jack, perch, chub, roach, and other fish, are amenable to its influence.

The condition of the water is always important, but this does not so much affect the Upper Wandle, which requires very heavy rain to discolour it at all. In other rivers the brightness in the colour of the water is of primary importance to the angler.

> "Now, when the first foul torrent of the brooks,
> Swell'd with the vernal rains, is ebb'd away—
> And, whitening, down their mossy-tinctur'd stream
> Descends the billowy foam—now is the time,
> While yet the dark brown water aids the guile,
> To tempt the trout."—THOMSON'S *Seasons*.

At sunset there is a moment when the whole river seems alive, and all the trout come to the surface. This interesting occurrence takes place every evening in summer, but more so on some evenings than on others; and, as the fish come up at once, so they usually all go down together, and the river becomes as silent as death. Our trout do not much come out to feed before nine or ten in the morning, and it is only during the very hottest nights that they continue to feed till ten at night. Unless we rightly understand the ways of the trout, we may say with Burns:—

"The trout within yon wimpling burn
Glides swift, a silver dart,
And safe beneath the shady thorn
Defies the angler's art."

As Grayling (*Thymallus vulgaris*) did not exist in the Wandle, I determined to endeavour to acclimatize it. At first I raised young ones from ova, but still no fish were found in the river. Resolved to give the experiment the fullest trial, I decided to introduce large fish into the Wandle; and Mr. Peach, of Derby, succeeded in catching nearly twenty brace and in transferring them safely and in good condition to our water. This was a very difficult and costly experiment; but though many of them lived for years, and resorted to gravel spawn-beds in spring, at the present time not only have no young fish been observed, but all the old fish except one or two have also disappeared. Some undoubtedly went down the stream; but ardent followers of Izaak Walton have been known to stand for hours together endeavouring to catch and destroy these fish, which cost so much trouble and money to place in the river. The destructive propensities of man are a great impediment to acclimatization.

The utter failure of this experiment is the more remarkable, as a similar trial was made upon the river Clyde, above Glasgow, and I have been informed that now plenty of grayling exist where heretofore there were none.

When I obtained the grayling, I took the opportunity of procuring some Burbolts or Eel Pouts (*Lota vulgaris*). One was caught some time

afterwards about a mile below my garden, which was sent to Mr. Frank Buckland as an unheard-of monster, but directly he saw it he exclaimed, "That is one of Smee's fish!" The experiment of introducing this fish, however, was a complete failure, as with the exception of that solitary individual, no one ever saw a burbolt in the Wandle.

Young Salmon-trout by thousands, and Char, have been reared and placed in the Wandle at my garden, all of which were bred from ova which the authorities of Huningue were kind enough to supply me, but none of the mature fish have ever been seen.

The first young Salmon placed into any tributary of the Thames, except varieties of trout, were placed in the tributaries of the Wandle at my garden. Many thousands were distributed in my streams, and also in some of those that run into the river Medway near Rochester. I have heard that occasionally salmon have been captured in the last-named river, but not in proportion to the numbers which have been bred. I felt so much interested in the question of the breeding of salmon that I made a journey to Hereford to observe the salmon fry on their pilgrimage to the sea. It was an interesting sight: thousands upon thousands of fish from four to six inches long were swimming down the stream in a shoal, making the water alive in their passage, and catching the flies as they passed. Anglers were ever on the watch for a shoal, and many were caught at that time. Penalties are enacted against the destroyers of these juvenile salmon, but I was informed on undeniable authority that the magistrates like them for breakfast, and therefore were unable to judge accurately whether they were really young salmon or the fry of some other fish. From the tens of thousands which I saw in the act of migration to the sea, I should think a very considerable number could be spared for the breakfast-table.

Next to the trout, the Eel (*Anguilla acutirostris*) is our most important fish.

"The silver eel in shining volumes roll'd."

There are two distinct migrations of eels through my garden: the one up the stream, of the smaller eels, in May, June, and July; the other, of larger eels, towards the sea, which chiefly occurs in

July, August, and September, and even later. Eels when running up are very pertinacious, and seem to be governed by an irrepressible instinct. We then see them ascending the Tumbling Bay. Sometimes the gardeners have found an eel on the path of the fernery, evidently seeking the river. Sometimes, when they could not ascend the Tumbling Bay, they have been seen wriggling amongst the roses near. At Twickenham I have seen quantities of young eels about three inches in length trying to ascend a vertical moss-covered wall over which a small shoot of water was flowing. These small eels in some places are caught, pressed into shapes about two inches across and an inch thick, the mass being sold for twopence, which is a scandalous destruction of future food.

In the migration up stream we catch sparingly the larger eels in wire baskets in which a bunch of red flowers or some red tape is fixed.

The great migration of eels down stream occurs with the first discoloration of water in summer: whenever a thunderstorm breaks over Croydon in summer, which discolours the water, we get abundance of fine eels in the great eel-trap, especially if the night be hot.

An Eel-trap is probably an engine peculiar to this country. The Huningue commissioners were not aware of its existence when they favoured my garden with a visit. It is an important device, as it procures a large amount of human food which would otherwise be lost.[1]

An eel-trap is really a sort of rough filter, which lets the water through but retains the eels. The filter is constructed of bars of wood about an inch and a half square nailed to a strong framework (fig. 1101), which is placed below the flood-gates and arranged at an angle, so that the water is forcibly driven through when the gate is drawn: at the farther end there is also a vertical grating about two feet high.

[1] *Receipt for Stewed Eels.*—Take three pounds of eels after they are cleaned, cut them in pieces about three inches long; flour them, and fry in lard or dripping until half done; have some stock ready, into which place the eels. Then mix together two teaspoonfuls of curry-powder, one of anchovy, one of soy, and one of Windsor or Reading sauce, one wine-glassful of port wine and a squeeze of lemon, and a little cayenne to your taste. The stock should be flavoured with herbs and an onion, and thickened. Stew for about twenty minutes.

When the gate is drawn, the water from the higher level of the mill-head or lake rushes through to the lower level of the mill-tail, and the eels are literally filtered out and remain in the trap.

It is presumed that the large eels run down to brackish water to spawn, and it is supposed that they ultimately perish there, and never return to their former haunts. The little eels swarm up the rivers by millions, and when a colony is on its upward migration it is called on the Thames the Eel Fair, in Somersetshire Eel Veres.

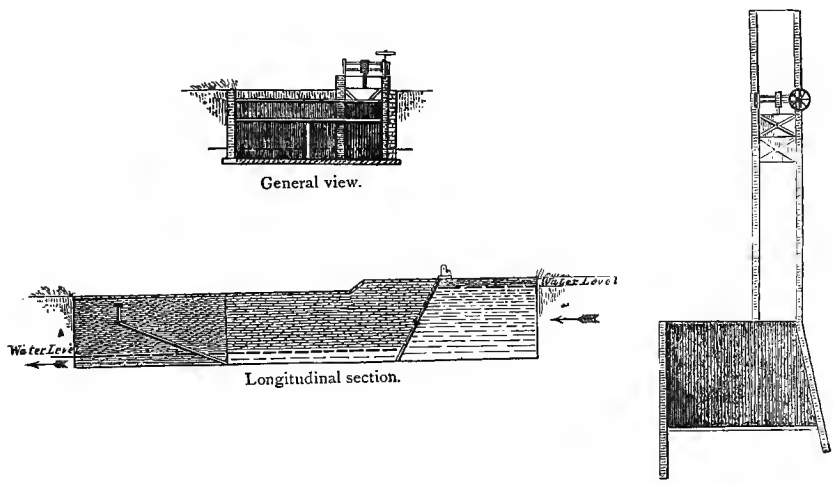


FIG. 1101.—Eel-trap.

Our eels are very excellent, and perhaps are trout-fed, as their voracity for young fish is prodigious. I do not think that many live in our water; at any rate we have no evidence of it; but I suppose that they come from the waters between us and Croydon, and that they pass through my garden in their up and down migrations.

Although eels are justly esteemed as a luxurious dish in England, Scotchmen will not touch them on any account, and no doubt countless tons are lost in European rivers which might with proper contrivances be secured.

Eels can be tamed, but they are restless and impatient of confinement. I had a little pet eel for a long time, which ultimately died of a surfeit. In a state of nature they are very curious creatures, and

formerly I was familiar with many of their habits by watching them in the river Lea, where they used to abound. They delight to live in holes in vertical banks against which the stream sets. They look out to see what passes, when with the velocity of lightning they dart out and seize their prey, and retire with it into their den. If an eel-hole is found, the eel will generally, but not always, take a worm: if it refuses, it pushes the worm out of its hole, but may be tried another day. Sometimes the eel takes a promenade, and on warm evenings roams over the shallows to catch the young fish. It always returns to its home, where it may be visited over and over again, till it is caught. An electrical state of the atmosphere makes eels very lively and active.

The species caught at our garden is the sharp-nosed eel.

Herodotus states that the Nile also produces the eel, which was sacred to that river.

The Lampern (*Petromyzon fluviatilis*, fig. 1102) visits my little streams in January and February, but their object in coming is not apparent. On warm days half a score or more amuse themselves with making a hole in the gravel, but for what purpose I cannot explain. Sometimes they select a spot near a trout spawn-bed, and some-

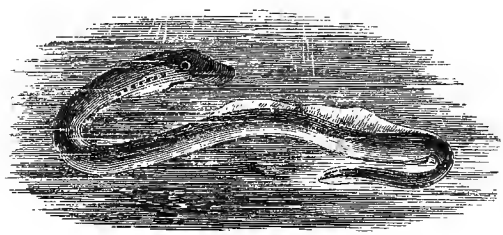


FIG. 1102.—Lampern.

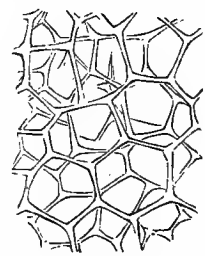


FIG. 1103.—Structure of Cartilage in the Lampern.

times another spot. Their motions are very graceful, and if they swim away for a short distance they return to the same hollow depression. When in the act of making this depression, their agility, and the power which they exhibit, are prodigious. They seize hold of a stone with their mouth, which is formed like a sucker, and then by a violent wriggling of the tail contrive to remove it. They may visit us for the purpose

of spawning,—and this is highly probable,—although I have never seen any of their young. After a time they leave the river, but where they go to I do not know; certain it is that no one has ever seen a single lampern during the summer in the streams of my garden or in other parts of the Wandle. Those which visit me are much smaller than those found in the Thames, which are caught in considerable quantities at Teddington and Hampton Weirs. They are sold to cod-fishers as bait, but are excellent for human food when potted.

The anatomical character of the lampern is curious, as it has cartilage in the place of bones. Quekett has given a good illustration of its structure (fig. 1103). It has seven apertures on each side of the head, through which it breathes, and hence is often called Seven-eyes. By counting these seven apertures with the eye and ear, it is also often called by the common people Nine-eyes.

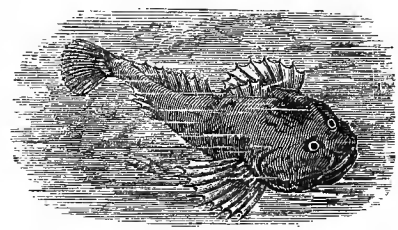


FIG. 1104.—Bullhead.

We have the Bullhead (*Cottus gobio*, fig. 1104) in our little streams in considerable quantities. They lie amongst the stones, and are very voracious, devouring any young trout or ova which may come within their reach. I have never observed any of their spawn-beds. I have found these creatures in the trout-breeding boxes under circumstances which made it a great puzzle how they could ever have entered them

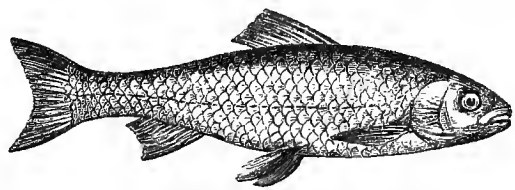


FIG. 1105.—Dace (from a drawing by Mr. Alfred).

The Dace (*Leuciscus vulgaris*, fig. 1105) inhabits the Wandle lower down the stream, but on rare occasions a solitary one has been seen at my garden. They are comparatively valueless in a trout-stream, and should be carefully destroyed. A shoal of very large ones rose to the surface at Mitcham, one of which I was able to secure.

Throughout the Wandle there are plenty of Sticklebacks of the species called by the learned the Half-armed Stickleback, or *Gasterosteus semiarmatus* (fig. 1106). They are very pugnacious and amusing creatures. They build a nest, and protect it. In the middle of May, I observed a stickleback evidently guarding a circle of about two inches in diameter, and chasing away every other fish which came within his domain. On closer examination, I saw at the bottom of the water a small circular place about two inches in diameter, made of fibre, but arranged level with the bottom of the stream. Suspecting a nest, I very carefully raised this material, when it proved to contain two parcels of eggs, which were about the size of a large pin's head. I immediately replaced the

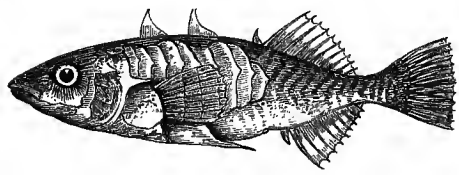


FIG. 1106.—Stickleback (from a drawing by Mr. Alfred).

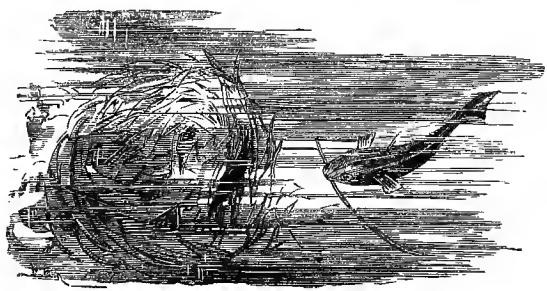


FIG. 1107.—Stickleback's Nest.

material as well as I could in its former place, but Mr. Stickleback was not at all satisfied with my arrangement, and set to work diligently to adjust it himself. He brought little bits of fibre and thrust them into the mass, and re-arranged the larger fibres. One parcel of eggs protruded: these he dragged away, and began to devour; but I took possession of this mass, and placed them in a jar with water-plants, where they soon after hatched into beautiful little fish. However, the stickleback continued his work at the nest. Sometimes he would bring a piece of fibre in his mouth, and with violence thrust it into the mass;

then, at other times, he would drag his body with all his strength over the mass to smooth it down. When he was perfectly satisfied with what he had done he mounted guard, and rushed at any other fish which came near him. This nest differs from that which the Rev. Mr Wood describes as being made by the fifteen-spine stickleback, in that it is merely a thin covering of fibres arranged over the ova placed in a hollow at the bottom of the river. I watched the gentleman stickleback for many days, and sometimes disarranged the nest for the pleasure of seeing him re-arrange it. Afterwards I found these nests by scores, each protected by its guardian stickleback; and in the month of May I can always delight my visitors by showing them a nest presided over by the pugnacious little fish (fig. 1107).

Some years since I introduced many Tench (*Tinca vulgaris*) into the river. They do not appear to have multiplied, and in fact we rarely see one at all, so that in their case acclimatization has been a failure.

We have neither the pike, perch, pope, chub, roach, rudd, gudgeon minnow, bleak, nor carp, though pike, perch, roach, and stone loach are found in some parts of the river.

Goldfish like warm water. I have placed these creatures in the fern-house, some in the little lake, where the water is about 50°, and others in the tank at the warm end of the house. Those in the warm water were very active and playful, and it greatly amused me to give them a piece of biscuit held tightly between my fingers, when they would nibble at it and fight for it and seize my fingers in play. However, the cats put an end to my amusement as well as to the gambols of the fish, as they contrived to catch them in their claws, and after a time not one was left. Goldfish deposit their spawn on water-weeds, and I have successfully bred them by placing the spawn in contact with such weeds: thus pisciculture may be practised in very small vessels under the rays of the sun.

REPTILES.

At Wallington there are no snakes; neither the Ringed Snake (*Tropidonotus natrix*), the Viper (*Pelias Berus*), nor the Slow-worm

(*Anguis fragilis*), have ever been seen at my garden; although the ringed snake has been noticed on the Sewage grounds.

The *Lacerta agilis*, or Active Lizard, I have occasionally observed in the saxifrage and sempervivum gardens. This lizard is very active, and lives on all the commons round London. The *L. agilis* is tameable, but neither so tameable nor so beautiful as the green lizard of France and Italy, which I have never found in this country. I have brought the latter home from the forest of Fontainebleau in France; I have caught them in Pompeii, and have seen them by thousands on the walls of Naples, and on the banks of the hedge-rows at the Cascina at Florence, and on some future occasion I hope to be able to introduce a colony into my garden. A number were collected for that purpose at Florence, but they contrived to escape, and great was my

FIG. 1108.—Frog.

FIG. 1109.—Toad.

anxiety lest they should make their way into the bed-room of a young lady ill with fever, who was so foolish as to be greatly afraid of them.

The Frog (*Rana temporaria*, fig. 1108) exists in moderate numbers in my garden, though we see no tadpoles in any of our small streams, but only in one little artificial pond. Their chief food is worms and insects.

We have the Toad also (*Bufo vulgaris*, fig. 1109) in moderate quantities, but it is a most welcome visitor to the garden. We catch toads in numbers, and place them in the fernery and glass-houses, where they eat innumerable insects and wood-lice.

I have often kept tame toads, and some have lived with me for years.

"The toad, ugly and venomous,
Wears yet a precious jewel in his head."—SHAKSPEARE.

One winter, by some accident, a toad was sent up to London in the hamper containing the vegetals for the house. Master Blanchet, the cat, which always investigated the Wallington basket, was down upon the toad in an instant, and by chance scratched out one of its eyes. The poor toad, on being speedily rescued from the claws of the cat, was placed in a Ward's case in my dining-room, where it soon became perfectly tame, and was fed upon black beetles specially caught for that purpose. It is an interesting fact that this toad, deprived of one eye, did not strike its prey so well as toads usually do. In a natural state toads strike their prey with the rapidity of lightning; they fix their two eyes upon the insect, by which they appear to judge of its exact distance, then they protrude the tongue with a velocity almost too great for the eye to follow, and carry the creature into their mouth. The toad, however, cannot reach its prey from so great a distance as the chameleon, which, after it has ogled its victim, protrudes a tongue six or eight inches long, using it as an organ of prehension. It is well to teach children to love and pet toads, so that they may be their garden allies.

My artist has copied the representations of the frog and of the toad from the admirable figures of the Rev. J. G. Wood, who perhaps has done more to promote a love of natural history amongst the multitudes than any man now living.

I have tried to acclimatize the common Land Tortoise, but without success. These creatures ramble far away in summer, and are lost. They delight in yellow flowers, which they see and go after from a considerable distance. One tortoise wandered away, and was killed during the construction of the railroad a thousand yards off. I have also tried to acclimatize the Water Tortoise, which is a flesh feeder. Many have been imported into my garden, and as these creatures live as far north as Germany there are reasonable hopes that I may ultimately succeed, especially as some survived the severe winter of 1870. Some of them have strayed to the road, where they have been captured by boys, who are sad enemies to acclimatization. The water-tortoises are very active, and on warm days come out of the water and sun

themselves on the bank. When disturbed they dive rapidly, and conceal themselves amongst the leaves and confervæ at the bottom of the river. These tortoises are now (1872) gradually disappearing.

Curiously enough, when at one time on a visit at Loch Lomond, I found one evening a Hawksbill Turtle. It was nearly dead, otherwise it would have been a fine creature to have introduced at Wallington. How this creature could have ascended the river Clyde and got into the Lake was a problem I was totally unable to solve, although some of the same species are occasionally found on the coast.

I have been kindly supplied by Dr. Günther with ova of the *Siredon pisciformis*, or Fish Lizard, which have hatched very satisfactorily in pans in my Grapery. They grew to a certain size and then perished, probably from the want of proper food. Dr. Günther strongly recommends an attempt to acclimatize them, as they are esteemed to be good for food. Probably the water of our streams is too cold for this South American curiosity.

MY GARDEN ANIMALS.

We generally keep one or two Dogs at the garden, and we have had some remarkable characters amongst them;—none more so, however, than one called Jack. Jack lived wild in London, and mounted guard with one of the police, accompanying him duriug the night on his rounds. Jack was a general favourite, and got his breakfast at one house and his dinner at another. When the children and nursemaids were out he was always amongst them, and many a child I have seen with its arms round Jack's neck, hugging him with all its might.

However, one day a cab-driver wantonly struck Jack with his whip: Jack resented this indignity, and never allowed the man to come into Finsbury Circus without attempting to tear him from his seat. Complaints were made to the police, who suggested that we should take possession of the dog, to save its life; but when we did so, loud were

the grumblings of the other friends of Jack, who did not approve of this appropriation.

The morning after he was taken into the house he jumped from the dining-room over the area railings—a most prodigious leap. He was then taken to Oxford by an undergraduate, and allowed to roam about, when some bargemen, seeing a fine dog loose, endeavoured to capture him in a net. Jack, however, pulled men and net into the river, whence they escaped with difficulty.

When Jack was taken to Wallington by railroad, he returned by the carriage-road, and it was with some difficulty that he could be induced to take up his abode in the garden.

One of his tricks was to decoy away my favourite sporting dog. Where they went we never exactly knew, but they used to return in a day or two with their jaws smeared with blood and hair, showing that they had visited the rabbits and hares, and had well feasted upon them.

Jack was a terrible fellow, and used to visit all the lady dogs in the neighbourhood. One day he went to a house where many dogs were kept, and there was a great fight; Jack killed and maimed two or three dogs, but was at last overpowered and literally torn to pieces, and nothing of him remained entire but his tail, which we now possess, mounted on a stick, and which reminds us of the miserable end of poor Jack.

We had another dog called Gyp, who was also a remarkable character. He never barked, but always bit upon a reasonable provocation being given. He never allowed any sack to be carried by a stranger, but would go straight to him and lay hold of him by the trousers till the sack was put down.

Once, when Gyp was on a visit to Finsbury Circus, the police one night thought they had discovered the track of a thief, and mounted my garden wall. Gyp, however, would not allow them to enter, and would have attacked them if he could have got upon the wall.

Gyp took great care that neither the pigs, ducks, geese, or chickens ever took any of his food.

My sporting dog Sherry was just as amiable as Gyp was pugnacious.

He permitted the pigs to steal his food, and so kind was he to all the creatures that cats, chickens, ducks, and geese were permitted to share with him his food and house, and the man who fed him was obliged to take care that this kind old dog had not his fair share taken rom him.

In a garden situated as mine is, cats are indispensable. The cats brought up in the garden are semi-wild in some respects, and yet often docile. In this natural state the fur is most beautiful, and in much finer perfection than that of the cats which dwell in our houses.

Sometimes my cats take to killing the moorhens; at others they delight in killing the trout, when we are compelled to destroy them; and one cat demolished every one of my gold-fish. When gentlemen are fishing, the cats are sure to be hidden close at hand; and when the fish is landed, they pounce upon it and stealthily carry it away. One evening—such was the impudence of one of my cats—on landing a fish the cat started out of the hedge and dashed at the trout before it was taken off the line. However, I was as quick as the cat, and swinging the fish round in a circle at the risk of breaking my rod, with the cat following, I managed to get the fish a yard ahead, when I gave the cat a good blow with my rod, and sent her scampering back to the bushes.

The garden cats seem to have nearly exterminated the water vole or water-rat; but the brown land rats come periodically in armies, and then they are too much for the cats. One poor creature had her ears torn to pieces by rats. After a battle with rats their constitution appears to suffer, and they frequently die. I saw a cat spring upon a mouse in a strawberry plant. She took it very carefully into the open ground, where she released it, and when it had run three or four yards again pounced upon it. She then took it up carefully as though it were a kitten, and again laid it down. The poor little mouse looked up at the cat most imploringly, when the cat fondled it with her paw, and brought it near to her. The mouse again ran away, and was recaptured as before, when the cat appeared to have treated it too roughly and to have injured it. She put the mouse down and watched it for

a few minutes, when it was plain it could not run away. Upon this she deliberately took the mouse by the head into her mouth, with the tail sticking out, and champed it up as a man would a radish. It is a curious problem why such cruelty and pain should be permitted in the general scheme of creation; for if a man had been as cruel to a cat as the cat was to the mouse, the man would have been sentenced by the nearest magistrate to a very severe punishment for being an inhuman monster.

The cats upon the whole, though they do us some mischief by catching the fish and killing the birds, yet do us more service by killing the rabbits, rats, and mice. The mice destroy the bees which fertilize the flowers; they also destroy the seed, and eat our bulbs. The field swarmed with mice when I first made my garden, but now the cats have caused a more reasonable balance of nature.

In a secluded corner there is the grave of a remarkable long-haired white Angora cat, which lived with us thirteen years, and was quite a character amongst cats. Every morning he watched me at breakfast, and, if I did not attend to him as I fed myself, would draw my hand to his mouth. One of his peculiarities was to decoy strange cats into the house, when he would give them a terrible mauling. But his history is too long to recount here. He died of old age, and a slab bearing the name of "Blanchet" covers his remains.

> "'Well, Puss,' (says man,) 'and what can you
> To benefit the public do?'
> The Cat replies: 'These teeth, these claws,
> With vigilance shall serve the cause.
> The mouse, destroy'd by my pursuit,
> No longer shall your feasts pollute;
> Nor rats, from nightly ambuscade,
> With wasteful teeth your stores invade.'"—GAY'S *Fables*.

Some years ago, when snow covered the ground for a considerable time in London, the public were puzzled by marks in a straight line in the snow. Some foolish persons considered that they were due to Satanic agency, upon which a talented friend of mine, now deceased, could not resist the temptation of playing a practical joke. He wrote

a lucid and convincing letter to a newspaper, with fabulous quotations, to prove that these marks were made by a Northern animal called an Uniped. He confided to me the secret, and was convulsed with laughter when he stated that he could not persuade those who had read his letter that such an animal as an uniped never could have existed. These aforesaid marks are made by Pussy, who in walking brings the hind-foot into the hole in the snow where the fore-foot had been before. I have observed horses to do the same on crossing the snow.

We very rarely have a visit from Squirrels (*Sciurus vulgaris*, fig. 1110), although they sometimes come to feast upon the beech-nuts. They are easily tamed when young, and are charming companions; at times, however, they are apt to damage the curtains. I have had at various times several as pets. They are hurtful in a garden, but

FIG. 1110.—Squirrel.

FIG. 1111.—Hedgehog.

delightful ornaments to a wood, for it is extremely pleasing to see them skipping from tree to tree upon the interlacing branches.

"The squirrel, flippant, pert, and full of play."—COWPER.

We have only once seen one Hedgehog (*Erinaceus europæus*, fig. 1111) in my grounds, though I have found the animal all round London. These animals are carnivorous, and feed upon beetles. It is a restless animal in confinement.

"Hedgehogs, which
Lie tumbling in my bare-foot way, and mount
Their pricks at my footfall."—SHAKSPEARE, *Tempest*.

Two species of Bats appear to reside with us, and delight us with their flight in the evening. Why these interesting creatures should be typical of the infernal regions is not easy to say, especially as they do

us much good by killing gnats and other insects. We have not the frugiverous bats in this country, specimens of which are to be seen in the Zoological Gardens, which astonish us by hanging themselves up with one leg, wrapping their wings around them, and feeding with their head downwards. Bats are most curious creatures, and many species live in England. I have not accurately determined the two species that visit my garden, but one is larger than the other. I believe them to be the Common Bat (*Scotophilus murinus*) and the Great Bat (*Scotophilus noctiluca*), but as I have never had one in my hand I cannot speak with any certainty on the subject.

> "Some war with rear mice for their leathern wings,
> To make my small elves coats."
>
> SHAKSPEARE, *Midsummer Night's Dream.*

The Mole (*Talpa europæa*, fig. 1112) frequents my garden rather more plentifully than is desirable. It is a restless animal, living mostly in the dark, but sometimes running on the surface of the ground, when it may be caught, but it cannot be kept long in confinement. Although I have had several, I never could tame them, or even keep them alive many hours. The mole has mere black tubercles, incapable of vision, in the place of eyes. The mole would be an inestimable benefit, by devouring wireworms and other noxious insects, did it not turn up the ground and uproot valuable plants.

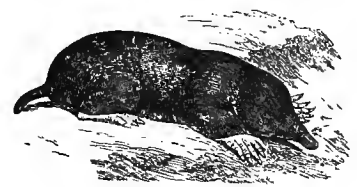


FIG. 1112.—Mole.

A few years ago a plausible article was written in favour of the mole, and the author recommended that the creature should be protected. This paper was generally accepted by naturalists at the time, but the mole is mischievous in gardens, and our practice is to catch the animal whenever it visits us. After establishing a rare plant, it is very vexatious for a mole to uproot it. There are a large number of these creatures in Beddington Park, but a little streamlet separates the park from the garden, which they must traverse to make an entry The mole is caught by an iron trap, which is set in the run ; it is

necessary to rub the trap with another mole to ensure much success. A great number were caught when I first had the garden, but now they have materially decreased.

The skin of this creature may be used for cloaks, but from the number required such a cloak is an expensive article, and costs about twenty guineas.

Plutarch says, that the Egyptians rendered divine honours to the mole on account of its blindness—darkness, according to them, being more ancient than light; and it was always held sacred to Buh, who was one of the most ancient Egyptian divinities.

> "Pray you tread softly, that the blind mole may not
> Hear a footfall."—SHAKSPEARE, *The Tempest.*

> "The blind mole casts
> Copp'd hills towards heaven, to tell, the earth is wrong'd
> By man's oppression; and the poor worm doth die for't."
> SHAKSPEARE, *Pericles.*

The Water Rat, or Vole (*Arvicola amphibia*, fig. 1113), lives in my garden. It is really not a rat, but a small species of beaver. It makes holes for itself in the banks of streams, and thus is very mischievous by undermining banks of rivers and canals. It is a vegetable feeder, and the statement that it is in the habit of devouring fish is a false charge. It sometimes does me damage by gnawing the roots of the trees, and rarely a winter passes without an apple or a nut-tree

FIG. 1113.—Water Rat.

FIG. 1114.—Brown Rat.

having its roots cut within a few inches of the stem. We destroy the vole by shooting it, but the cats appear to have nearly exterminated them in my garden. When the vole takes to the water the air adheres to the hair of the animal, and as it glides through the water below its surface a silvery object is presented to view, which has puzzled many persons, as in this respect it resembles the water shrew.

We have the Brown Rat (*Mus decumanus*, fig. 1114), a voracious and ferocious brute, which has been introduced into this country, and has extirpated our national Black Rat (*Mus rattus*).

> "Curse me the British vermin, the rat!
> I know not whether he came in the Hanover ship,
> But I know that he lies and listens mute
> In an ancient mansion's crannies and holes."—TENNYSON.

It breeds in our place, and destroys our young chickens, injures our cats, and eats our seeds and garden produce. A former gardener stated that one of these creatures made a nest of a valuable specimen of Irish fern. In autumn they occasionally visit us in colonies. They may be poisoned by phosphoric rat paste; but if cats, or perhaps if pigs, eat these poisoned rats, they are liable to be also destroyed. Phosphoric rat paste is made by preparing a mixture of oatmeal in hot water, and then stirring in some sticks of phosphorus, which melts and becomes disseminated through the mixture. The rat mines with facility, and hence we have great difficulty in preventing it from going where it chooses. It hoards large stores of nuts, corn, and other food.

We have never seen the Black Rat at my garden, although several have been caught at Finsbury Circus, some of which were sent to the Zoological Gardens. Rats are readily tamed. I have seen French soldiers at reviews with pet rats on their shoulders. I had one which was pleased to sit on a servant's shoulder when he traversed London.

> "A rat, a rat! clap to the door—
> The cat comes bouncing on the floor:
> Oh for the heart of Homer's mice,
> Or gods to save them in a trice."—POPE.

We have the Common Mouse (*Mus musculus*, fig. 1115). It is a pretty creature, but very mischievous, eating our seeds and bulbs. When they are troublesome, if the cats do not destroy them, we trap them. The phosphoric rat paste is very poisonous to them.

> "The cat, with eyne of burning coal,
> Now couches 'fore the mouse's hole."

The Field Mouse (*Mus sylvatica*, fig. 1116) used to exist in vast

quantities, but the cats have materially lessened their numbers. I do not know what injury they inflict upon us, as evidently they were far more common before the garden was made.

FIG. 1115.—Domestic Mouse.

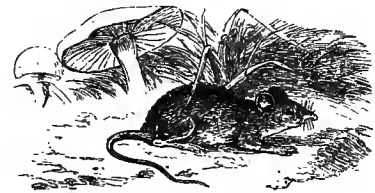


FIG. 1116.—Field Mouse.

The curious little Harvest Mouse (*Mus messorius*, fig. 1117) exists over our district, but is rarely seen except in August. It is the smallest of all British quadrupeds, but I have been unable to observe its natural history.

FIG. 1117.—Harvest Mouse.

FIG. 1118.—Short-tailed Campagnol.

The Short-tailed Campagnol (*Arvicola pratensis*, fig. 1118) is occasionally killed by the cats in our grounds, but beyond that I know nothing of its haunts or habits.

We have many of the common Shrew Mouse (*Sorex araneus*, fig. 1119) in our grounds. It is a curious fact that, though the cats kill

FIG. 1119.—Shrew Mouse.

FIG. 1120.—Water Shrew.

this species, they do not devour it. It lives entirely upon insects and worms, and therefore is a good ally to the gardener.

We occasionally see the Water Shrew (*Sorex fodiens*, fig. 1120) in our streamlets. It is very shy, and therefore its habits are diffi-

cult to observe. When it enters the water the air clings to its fur, and hence when the sun shines it looks like a mass of glass in the water, and the observer is greatly puzzled as to what it can be. Those who have the opportunity of observing the crystal chalk-water streams should carefully watch for this curious creature. From its extreme timidity, and the rapidity with which it dives to the bottom, the observer must remain perfectly motionless if he wishes to watch its actions.

We occasionally see the Stoat (*Mustela erminea*, fig. 1121), but not often. I have seen one in the act of killing a rabbit; a single bite at the back of the head destroys its victim.

FIG. 1121.—Stoat.

FIG. 1122.—Weasel.

I believe we have also the Weasel (*Mustela vulgaris*, fig. 1122), which, although killed by gamekeepers, is supposed to be of service in destroying rats and mice. I cannot, however, speak from my own knowledge as to its relative benefit or injury.

THE RABBIT.

We are fortunately not much troubled by Rabbits (*Lepus cuniculus*), but occasionally a few have come from Beddington Park. When they are numerous, the mischief they do is incalculable. I have been informed that on one estate in Scotland the rabbits which are killed and sold realize between 700*l.* and 800*l.* a year. In spring and summer they eat the young shoots and flowers, but in early spring they commit wholesale ravages on young trees, of the bark of which they appear at that time to be very fond. When the sap commences to rise, young shoots of trees are nutritious to animals endowed with teeth competent to masticate them; and I have been informed that in

America, when the animals hear the woodman's axe, they run to get their share of the small shoots when the tree falls. On one occasion my cattle barked a number of walnut-trees; so that it is necessary to protect all young trees from cattle. The wild rabbit is capable of being tamed, when it becomes one of the most interesting of pets.

We have not the Dormouse (*Myoxus avellanarius*), though I have often seen it at Tunbridge. It makes a curious nest, somewhat like that of a bird, which is often disclosed to view when the leaves drop, when nest and dormouse may be taken at the same time. They are common throughout Kent, and are also said to be found a few miles below my garden. Those nests that I have found with the mouse inside, appear to be completely closed, from which I infer that the creature closes the aperture when it enters, and thus only a ball of grass and leaves is exposed to view.

I do not think that the Otter lives in the valley of the Wandle at the present time, though two large ones were killed in Carshalton Park a few years since, one of which was stuffed and kept in Beddington Hall.

THE BIRDS.

"I heard a thousand pleasant notes
While in a grove I sate reclined."
WORDSWORTH.

A garden, however lovely it may be, is never complete unless it is plentifully tenanted with birds; and every year it is a matter of solicitude to me to know when the nightingale arrives, and how many have taken up their abode in my garden. My son, who more particularly notices the different species of birds, has observed about 104 in our garden; and in Brewer's "Flora of Surrey," the names of 115 species are recorded. Of those which have been noticed in or near my garden, some are rare or accidental visitors, others merely pass over in their migrations or wanderings. Many come from the south to spend the summer, some from the north to pass the winter, and others live with us all the year.

Our water is the resort of various water-birds. One winter, during the cold weather, we had a visit from the Hooper Swan (*Cygnus ferus*, fig. 1123). He alighted on the lake, and remained peaceably on the same piece of water with the other swans, though he kept at a respectful distance from them. When the period of

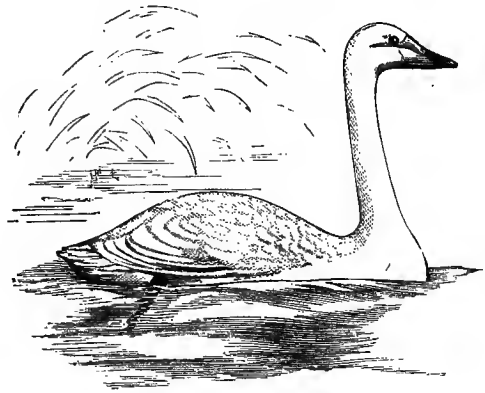


FIG. 1123.—Hooper Swan.

incubation came, the common swans would no longer tolerate his presence, and drove him ignominiously from the lake.

> "Behold as with a gushing impulse heaving
> That downy prow, and softly cleaving
> The mirror of the crystal flood."—WORDSWORTH.

On the island we have a swannery, where the Common Swans (*Cygnus olor*, fig. 1124) build and rear their young. Sometimes they have five, at others seven at a brood. When first hatched the old birds continually guard their young, which at the slightest alarm run up the back of the female swan, and are carried about by her.

> "So doth the swan her downy cygnets save,
> Keeping them prisoner underneath her wings."
> SHAKSPEARE.

On these occasions the male bird remains near at hand, and is ready to fight all aggressors; and woe to any dog which shall come within his reach. He does not, however, carry the young swans on his back. I once knew a rat to build its nest in a hole near a swan's nest. The male bird having discovered it, thrust his beak into the

hole, and each time brought out a young rat, which he crunched with his powerful beak. My male swan (fig. 1124*a*) has a marking on each side of the head of a bright pink colour, produced by coloured feathers, which come after moulting, and last till the following July.

The young birds attain a fair size by Michaelmas, about which time we usually catch them to be fattened. For this purpose they are placed in a pen in the watercress brook and fed with biscuits and corn—a rather expensive process, as at Norwich, where this plan is followed out, the charge for fattening a swan is one sovereign. The birds are often of great weight, and when killed require to be kept two or three weeks to make them tender; they are then

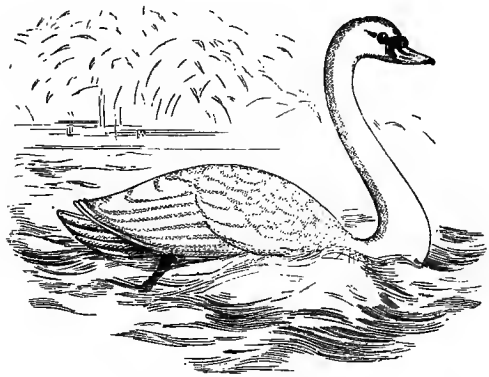


FIG. 1124.—Common Swan.

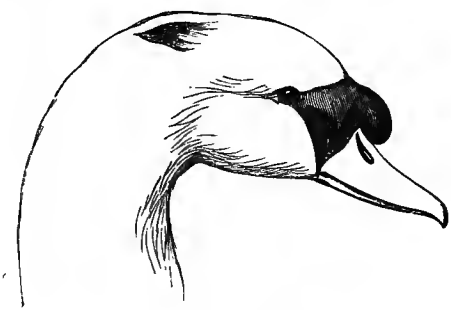


FIG. 1124*a*.—Head of Swa

roasted, when they taste somewhat like wild duck, and should be eaten, like them, with lemon and cayenne pepper.

Before Christmas the old swans begin to drive their young, when, if not pinioned—that is, having their wings amputated at the elbow-joint—they will rise from the water, soaring aloft in the most graceful manner, and visit some other locality. These flying swans are a great ornament to the neighbourhood, for a flight of six or seven is a fine sight.

I was advised to keep swans by Professor Owen, in order to lessen the American water-weed (*Anacharis*), and this advice has proved to be most excellent, as a pair of old swans with their progeny devour and destroy a prodigious amount of this weed in

the course of a year. Our swans are only fed in the spring, but it is found to be a good plan to give them soaked biscuit from the middle of January till May, as a female swan once died during the period of nidification and incubation, possibly from inadequate food.

Mr. Frank Buckland, speaking of swans in relation to the destruction of the spawn of fish, says, "Found guilty." As far, however, as the destruction of trout spawn is concerned, I say, "Innocent," as I have no reason to suspect that my swans have ever touched the trout spawn-beds.

> "The stately-sailing swan
> Gives out his snowy plumage to the gale;
> And arching proud his neck, with oary feet
> Bears forward fierce, and guards his osier-isle,
> Protective of his young."—THOMSON'S *Seasons.*

We keep a few white Call Ducks on the water, which are amusing on account of their vivacity. The noise they make is astonishing, and they are useful to decoy down wild duck, widgeon, and teal as they pass over. Their bills are highly endowed with nerves, so that

FIG. 1125.—Wild Duck.

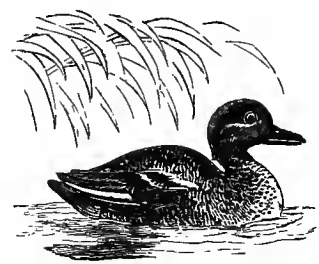


FIG. 1126.—Teal.

when they put their heads under water they can find and successfully extract every ovum from the spawn-bed. For this reason, wherever trout are of importance ducks should be prevented from visiting the water. It is the female bird whose noisy call apparently attracts and decoys the wild bird. The note of the drake is less distinct—being

more of a whistle,—especially in the breeding season, and is not unlike the whistle of the widgeon. The young call-ducks which were reared last year, were taught by the gardener to dive for their food. It is very amusing to throw some barley into the lake and watch them dive, and feed under the water. The parent birds, however, have never been noticed to dive: I am uncertain whether this habit of diving is natural, or has only been acquired by training.

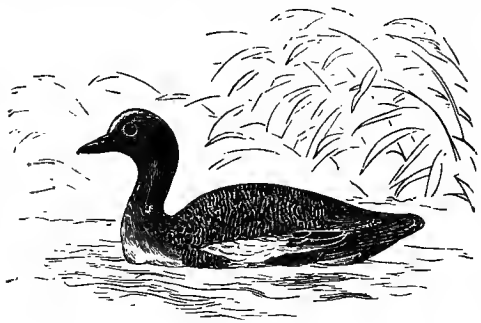


FIG. 1127.—Widgeon.

During the winter season we have the Wild Duck (*Anas Boschas*, fig. 1125), the Teal (*Querquedula crecca*, fig. 1126), the Widgeon (*Anas Penelope*, fig. 1127), and the Tufted Duck (*Fuligula cristata*, fig. 1128).

In January 1871, our gardener shot on the mill-head a female Smew (*Mergus albellus*, fig. 1129). On the coast of Norfolk this bird is

FIG. 1128.—Tufted Duck.

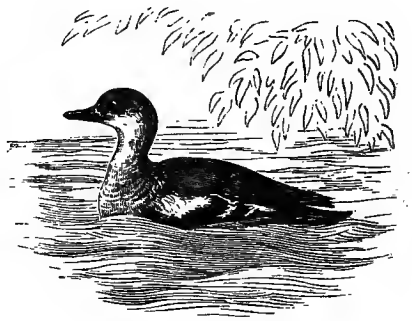


FIG. 1129.—Smew or Smee Duck.

called the Smee Duck, but how it obtained our name I know not. It is a remarkable fact that almost all the specimens of this bird which have been shot in this country have been female or immature birds, and it is probable that the adult males seldom visit our shores. The adult male is an elegant and handsome bird. Although in winter its plumage consists of only black and white, it is nevertheless

very handsome and conspicuous, and would make a capital mark for the gun of the sportsman. These birds are said to be very shy, rapid and expert divers, and more impatient of cold than the duck tribe generally. Little is known of the time or the place of its breeding.

FIG. 1130.—Little Grebe, $\frac{1}{3}$th nat. size.

FIG. 1131.—Sclavonian Grebe, $\frac{1}{3}$th nat. size.

We have always the Little Grebe, or Dabchick (*Podiceps minor* fig. 1130), on the water, although in limited numbers, which is curious, as on another mill-head near Croydon they exist in great abun-

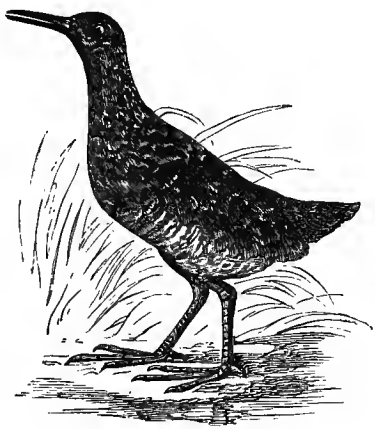


FIG. 1132.—Water Rail, $\frac{1}{4}$th nat. size.

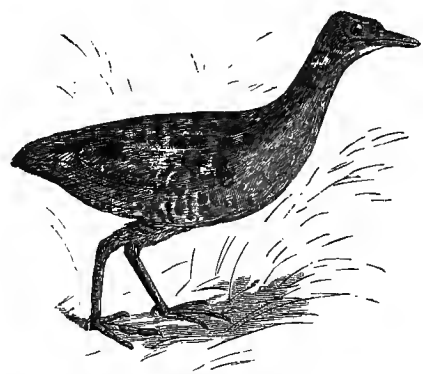


FIG. 1133.—Land Rail, $\frac{1}{4}$th nat. size.

dance. They dive for food, and are rather shy, so that I have never been able, at my garden, to observe much of their natural

history. They are more frequent in winter than in summer, and occasionally breed with us. A specimen of the Sclavonian Grebe (*Podiceps cornutus*, fig. 1131) has once been obtained from our water.

The Water Rail (*Rallus aquaticus*, fig. 1132) has been seen in winter during the last few years; and the Land Rail (*Crex pratensis*, fig. 1133) has been heard in the meadows in summer.

Moorhens (*Gallinula chloropus*, fig. 1134) exist in large numbers on our water, and are a great ornament to the lake. They breed freely with us, and sometimes construct their nests in the bulrushes just above the water-line, and sometimes in the bushes; and one which

FIG. 1134.—Moorhen.

FIG. 1135.—Moorhen's Nest.

I have figured (fig. 1135) was made in a black-currant bush. It is interesting to see the moorhen, when the little brood are hatched, conducting them over the lake, and showing them where food is to be found. The swans quarrel with them, especially the male swan, which cruelly kills the young ones when he can get at them. I once saw a moorhen heroically defend her young brood. She assumed a defiant attitude and flew at the swan, taking care to keep out of reach of his bill. By this manœuvre the swan's attention was diverted, and the young birds, being much frightened, betook themselves, with the exception of one which was cruelly crushed up by the swan and killed, to safe quarters amongst the flags. If food be scarce, the moorhens do some damage by eating the lettuces and cabbages; otherwise they feed exclusively upon the water-weeds. These birds, from being seldom molested, become bold, and will walk about the

lawns by the river-side during the day, but they always retain their crafty and skulking habits. I have seen them take to the tops of the highest trees, after my son has had two or three shots at them, or else they will skulk in the hedge-rows, and not be seen again for some days. It is said that these birds can submerge their bodies, just keeping the top of their beak above water for breathing, thus eluding observation.

The Bald-faced Coot (*Fulica atra*, fig. 1136) has visited our water the last two or three years, and two were shot as specimens; otherwise it is desirable to retain them as call-birds.

FIG. 1136.—Bald-faced Coot, ⅛th nat. size.

FIG. 1137.—Heron.

Wild Geese have been seen crossing over the garden, but have never been known to settle.

The Heron (*Ardea cinerea*, fig. 1137) comes to our water, and, though so elegant on the wing and so interesting to observe, is not altogether a welcome visitor, especially as he delights to come at night. The heron is most destructive to trout: he stands on the shallows, and when a trout comes near him it is instantly transfixed by the heron's powerful beak. Many a large fish is thus destroyed, besides those which are devoured, and hence they are doubly destructive. If a person wants herons, he cannot have fish; and

if fish are wanted, it is impossible for him to keep herons. It is usual on the Upper Wandle to watch for the herons at night, and shoot them. They are also frequently taken in rabbit traps.

There is no heronry around us, although they build on the tops of the tallest trees. The nearest one to us that I have heard of is at Cobham Park, near Gravesend; there is another at Claremont, on the river Mole. Formerly they built at Wanstead, and I have

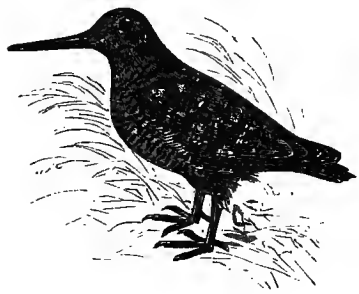


FIG. 1138.—Woodcock, ⅛th nat. size.

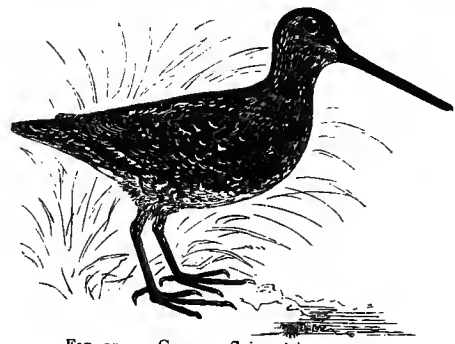


FIG. 1139.—Common Snipe, ⅛th nat. size.

seen a nest at Chigwell in Essex: probably our herons come from Claremont. I have also heard of a heronry in Windsor Park. These birds visit Beddington Park and the upper part of my water.

A bird supposed to be a Crane (*Grus cinerea*) appeared in the Park every evening for fifteen or sixteen days, in February 1871, but it was never absolutely authenticated.

FIG. 1140.—Jack Snipe.

FIG. 1141.—Sandpiper.

The Woodcock (*Scolopax rusticola*, fig. 1138) visits the garden, and two species of snipes: the Common Snipe (*Scolopax gallinago*, fig. 1139), which is found abundantly on the Sewage grounds every winter;

and the Jack Snipe (*Scolopax gallinula*, fig. 1140), which, though fewer in number, is constantly flushed every winter. It is pleasant to walk round our ferneries or rosaries during frost and snow and put up a snipe.

The Summer Snipe, or common Sandpiper (*Totanus hypoleucos*, fig. 1141), visits the garden sparingly every year. The Green Sandpiper (*Totanus Ochropus*) has also been occasionally seen. The Whimbrel and Curlew have been heard crossing over of an evening during their

FIG. 1142.—Peewit.

FIG. 1143.—Partridge.

autumn migration. Gulls have not often been observed, and when seen have generally been flying very high. The gull has once been noticed by the gardener swimming in the mill-pond. The Peewit (*Vanellus cristatus*, fig. 1142) visits the Sewage grounds; and my gardener states that he has seen the Golden Plover (*Charadrius pluvialis*) in winter in Beddington Park. A stray Partridge (*Perdix cinerea*, fig. 1143) and Pheasant visit us now and then, and one Quail has been seen in one of our meadows. Partridges exist in fair quantities on the downs, and pheasants used formerly to be preserved in the Park.

FIG. 1144.—Turtle Dove, ½th nat. size

The Turtle Dove (*Columba Turtur*, fig. 1144) appears in the district plentifully in August, and the Stock Dove (*Columba ænas*), a very shy bird, also frequents the neighbourhood.

"The stock-dove, unalarm'd,
Sits cooing in the pine-tree, nor suspends
His long love-ditty for my near approach."—COWPER.

The Wood Pigeon (*Columba Palumbus*, fig. 1145) lives with us all the year round, and breeds every year in the trees bounding my garden and throughout Beddington Park. At times they water at the central brook, and then they come every day for that purpose. The wood pigeon is an interesting bird. In the Tuileries Gardens at Paris they used to sit, sometimes a dozen or more, on the bare branches of the trees. Whenever I went to Paris, I always paid my respects to the wild wood-pigeons, and bestowed upon them some crumbs from my breakfast-table. It was pleasing to see, in the midst of a great city, one of the wildest of birds coming to call from the top of high trees to take bread from the hand, and even from the lips, of man. But my son, who visited Paris in December 1871, has informed me that all is now changed, and that he did not see a single wood-pigeon in the Tuileries Gardens, although he expressly looked for them. Whether this timid bird was driven from Paris by the German bombardment, or was scared away by the terrible conflagrations during the last days of the Commune, or whether they were killed for food during the first siege, will probably never be known. I should like my garden all the better if I could do the same there with the wood-pigeons as I used to do n the Tuileries Gardens, for anyone may tame this wild and shy bird by kindness and gentleness; but there are too many ruthless destroyers of the feathered tribes around the district.

FIG. 1145.—Wood Pigeon, $\frac{1}{8}$th nat. size.

In the autumn of 1869 flocks of wood-pigeons, at intervals, in numbers from ninety to five hundred, crossed my garden, generally in the forenoon, and flew in a S.S.W. direction. On the 3rd January, 1870, probably six or seven thousand crossed from the north-east to the south-west. The birds appeared tired, and settled on some tall elms, but after resting a short time they again took to wing. For

some weeks after that time not a pigeon was to be seen in the neighbourhood, but in the beginning of March they reappeared as usual.

"Ring-dove beauteous, is the face
Of man so hateful, that his sight
Startles thee, in wild affright,
From beechen resting-place?"—MOIR.

The Rock Dove (*Columba Livia*) builds in holes in rocks, but I do not know whether it breeds near my garden. The rock dove is the parent of the home pigeon, which is so useful for pigeon telegraphy. Mr. Tegetmeier has stated that during the siege of Paris about three hundred trained pigeons belonging to a Belgian gentleman were sent by balloon from the capital, and were employed to carry despatches from thence. The messages were set up in type and photographed on collodion, so minutely that they could not be deciphered by the unaided eyesight, but when placed under the microscope they could be distinctly read and perfectly copied. These aërial messengers baffled the military skill of the Germans, who in their turn employed hawks to kill the pigeons, but, it is believed, with little or no success. Before electro-telegraphy was discovered pigeons were extensively employed for telegraphic purposes, and when I was a boy large establishments existed not far from my home. I used to keep pigeons, which returned over and over again, when sent away. It is believed by some persons that pigeons possess an inherent power or instinct which enables them to find their way home from very great distances; but this is not the fact. They require to be carefully trained, and taught the way to their home by repeated journeys, which is done in the following manner. A bird is selected with large brain, showing natural intelligence, and with a finely formed wing with large broad feathers and straight when expanded. Having selected a promising bird, he is taken a short distance the first day; on the second the distance is doubled, and so on from stage to stage till a distance of five hundred miles is attained. A good bird will fly a hundred miles in one hour, and forty-five miles an hour for eight consecutive hours, so the velocity in long journeys is great. When making long flights pigeons rise to

such an altitude that they are scarcely visible by the naked eye, and therefore are safe from gun-shot. From the experience which the late war has afforded, pigeons, though the emblems of peace, may become useful accessories in war. For two thousand years the pigeon has been used as a letter-carrier. Shakspeare alludes to the circumstance of pigeons being thus employed :—

"News, news from heaven !
Marcus, the post is come."

I have never seen the Goatsucker, or Nightjar (*Caprimulgus europæus*), in or about my garden, although it appears a short distance from it, where its silent flight towards night is a very interesting feature. The Swift (*Cypselus Apus*, fig. 1146) abounds in our district. Its scream

FIG. 1146.—Swift.

is very pleasing as it dashes by, and nowhere is this observed more in perfection than at Florence, where the continuous screams of birds which fly past the window make such an impression on the ear as never to be forgotten.

"To mark the swift in rapid giddy ring
Dash round the steeple, unsubdued of wing."
GILBERT WHITE.

The Sand Martin (*Hirundo riparia*, fig. 1147) may be seen skimming over the lake, but it does not breed near the garden. The House Martin (*Hirundo urbica*, fig. 1148) is a constant visitor, and is the most numerous of all the Hirundinæ.

"As swift as swallow flies."—SHAKSPEARE.

The Swallows (*Hirundo rustica*, fig. 1149) receive from us every hospitality, and they build on the rafters of our large summer-house.

Each year they occupy two nests (fig. 1150), and it is a curious fact that if the nests are in a tolerable condition they are used over and over again, although from the situation in which these nests are placed it is difficult to believe that any other but the same birds, or their young ones raised in the same spot, could by any possibility have found them

FIG. 1147.—Sand Martin.

FIG. 1148.—House Martin.

In this summer-house we frequently have many visitors, when the poor birds are somewhat scared; even then they contrive to feed their young, though the old birds show timidity, and often sit upon the railing outside for some little time before they can summon up

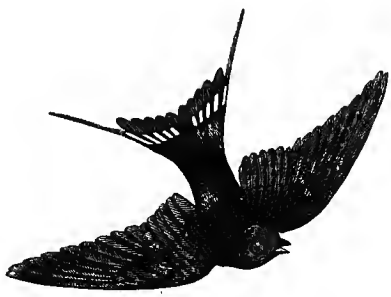


FIG. 1149.—Swallow.

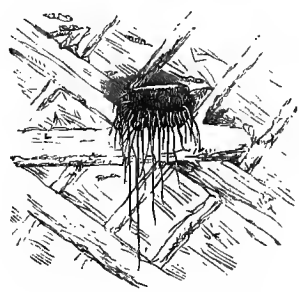


FIG. 1150.—Swallow's Nest.

courage to enter. However, the powerful instinct which prompts the birds to feed their young at length prevails, when they sweep into the house, and in an instant fly away again to obtain more food. The young birds sleep away their time till the parents come to feed them, when they take the food and sleep again.

"A bird awakened in its nest
Gives a faint twitter of unrest,
Then smooths its plumes and sleeps again."

LONGFELLOW.

The Swallows leave their eggs many hours at a time, when the eggs feel quite cold to the touch: nevertheless, the birds are hatched in due time.

"How fair the scene!
I wish I had as lovely a green
To paint my landscapes and my leaves!
How the swallows twitter under the eaves!
There now! there is one in her nest;
I can just catch a glimpse of her head and breast,
And will sketch her thus in her quiet nook."—LONGFELLOW.

When the time of migration arrives, they appear to leave Europe at the same time from all parts. One year, in October, I travelled hastily to the Mediterranean after the swallows had left England, and then found that they had also left France; but whence they come and where they go, no one can precisely tell: probably Africa is their winter dwelling-place. Herodotus says that swallows are never known to be absent from Egypt.

The Kingfisher (*Alcedo Ispida*, fig. 1151) is a bird with plumage of great beauty, but it is of rapid flight and shy habits. It has bred in our grounds, in holes in the bank of the river, and generally in the burrows of the water rat. The situation of its nest may be known by the bones of fish which are strewn about the orifice. It has a sharp and shrill cry. Although destructive to small fish, the kingfisher is always tolerated for the beauty of its plumage. I have seen it through the greenhouse windows sitting on our breeding boxes, and in spring the birds have terrible combats for the mastery.

FIG. 1151.—Kingfisher.

The merry Cuckoo (*Cuculus canorus*, fig. 1152), the "messenger of spring," visits our grounds every year, and frequents the high trees on the north-east side of the garden. Some years ago I remember a surprising number of young birds to have been bred at the Horse-shoe Point on the river Lea, at Upper Clapton; and though more than a dozen were shot, yet every day a great cuckoo might be seen being

fed in the most affectionate manner by a very little bird, in the nest of which it was reared. In the year 1871, a young cuckoo was caught at my garden and placed in the Poor Man's house. The foster-mother, a sedge warbler, found it out, and came into the house and fed it

FIG. 1152.—Cuckoo, $\frac{1}{8}$th nat. size.

FIG. 1153.—Nuthatch.

regularly, till one day the cuckoo contrived to escape through a broken pane of glass, and was no more seen. It was strange to see so small a foster-mother rearing so large a foster-child, and to be seemingly so fond of it.

"O blithe new-comer! I have heard,
I hear thee, and rejoice:
O cuckoo! shall I call thee bird,
Or but a wandering Voice?"—WORDSWORTH.

Mr. Harting, in his charming book on "The Birds of Shakspeare," states that the oldest sample of English secular music preserved amongst the Harleian MSS. (No. 978) thus notices the cuckoo:—

"Murie sing, Cuccu!
Cuccu! cuccu!
Well singes thu, Cuccu!
Ne swih thu naver nu."

(Merrily sing, Cuckoo!
Cuckoo! Cuckoo!
Well singest thou, Cuckoo!
Mayest thou never cease.)

The Nuthatch (*Sitta europæa*, fig. 1153) has been shot in Beddington Park, but, owing to its active and shy habits, is not often seen. This bird is able to traverse the trunks of trees, not only upwards,

like the Tree Creeper, but downwards, head first, as in fig. 1153. A friend of my son, Mr. W. H. Power, has noticed this bird carry off acorns from an evergreen oak, but what it did with them he was never able to discover.

The Wren (*Troglodytes vulgaris*, fig. 1154) is one of our constant residents, and endears itself to us by its song, and by its pretty little ways. It delights to build in our summer-houses, and when we take refreshment there, it is most amusing to see the little creature come to feed its young ones, as it uses the most cunning devices to enter and to leave unseen; it climbs up the rafters, and, having fed its young, drops out of the nest and rapidly flies away. I have observed that this

FIG. 1154.—Wren.

FIG. 1155.—Wren's Nest.

bird, when it brings food to the nest, takes away all the droppings of the young birds to a distance; but whether for sanitary purposes, or to prevent the discovery of the nest, I do not know. We have always many wrens' nests (fig. 1155) in the grounds,—some in our summer-houses, some in trees, and one was built last year in an old stump in such a situation that it was impossible to pass without touching it, and yet it was never found by any of our cats, nor do I remember that the prying eyes of any of my young children friends ever saw it till I pointed it out, and then they were delighted to gratify their curiosity by putting in their little fingers to feel the eggs; and after the young birds were hatched the children were in raptures when the young birds mistook their finger for their mother, and opened their mouths for food.

The Creeper (*Certhia familiaris*, fig. 1156) runs over our trees in search of insects, but I know little or nothing of its natural history.

FIG. 1156.—Creeper.

FIG. 1157.—Wryneck.

Last year the gardener found a young Wryneck (*Yunx torquilla*, fig. 1157). He placed it in the Poor Man's house, where it soon discovered an ant's nest. It devoured all the so-called eggs in a few days, and then died.

FIG. 1158.—Spotted Woodpecker.

FIG. 1159.—Jay, $\frac{1}{8}$th nat. size.

The handsome Green Woodpecker (*Picus viridis*) has been observed only once, but the Lesser Spotted Woodpecker (*Picus minor*, fig. 1158) has been seen on several occasions. One of the special peculiarities of the green woodpecker is its very long tongue, which it uses as an organ of prehension to take insects. In a street in Paris there were a few years ago two tame birds placed in cages one above the other: it amused me much to see the bird in the lower one craftily attemptnig,

by means of its long tongue, to steal the food from the one in the upper cage. The length of tongue reminded me of the chameleon, though the woodpecker took its food slowly, and not with the rapid dart of the chameleon. Why the Woodpecker should be called unlucky is not very apparent; nevertheless the bard sings:—

"Teque nec lævus vetet ire picus,
Nec vaga cornix."—HORACE, *Ode* 27.

An occasional Jay (*Corvus glandarius*, fig. 1159) has been seen, but they are more commonly resident in large woods, where they are destructive to the eggs of birds.

FIG. 1160.—Magpie.

Magpies (*Pica caudata*, fig. 1160) have been observed in my grounds, but they are scarce throughout the district. They are charming, active birds for pets. One which used to breakfast with me every morning was always intent upon securing the butter; and when I resided in the Bank of England, a pet I had then used to get into the offices and hide the pens and upset the ink. Another great amusement of his was to pull the dog's tail when he was asleep, and hop away before he could be caught.

Jackdaws (*Corvus monedula*, fig. 1161) abound, and are sometimes troublesome, as they come in flocks when the gardeners are at dinner, and in a few minutes devour a whole crop of peas.

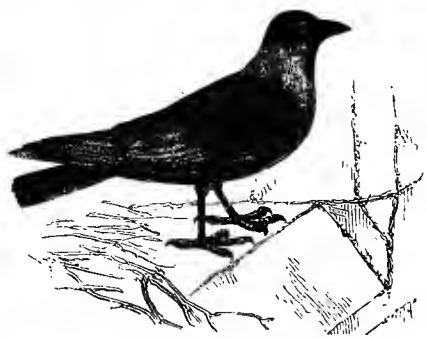


FIG. 1161.—Jackdaw.

We have the Carrion Crow (*Corvus corone*, fig. 1162). A few Hooded Crows (*Corvus cornix*), formerly considered to be sacred to

Apollo, have been seen on two or three occasions. In the neighbouring county of Kent they are very common, but do not breed.

There are rookeries, and abundance of Rooks (*Corvus frugilegus*, fig. 1163), all around us. There was once a large rookery on large trees in Beddington Park—

"Towns aërial on the waving trees"—THOMSON'S *Seasons*.

which have since been cut down. One summer evening I was greatly amused by a little incident which disturbed the equanimity of the rooks.

FIG. 1162.—Head of Crow, ⅓rd nat. size.

FIG. 1163.—Rook, ⅛th nat. size.

A balloon passed over their nests, and the birds set up such a chatter at its approach as was never before heard. When, however, in spite of their protests, it still approached and swept directly over head, the birds thought it prudent to retire, when they flew away in two great columns, one to the north and the other to the south, and after wheeling in circles returned to their quarters when the balloon had passed. If we could but have understood their language, we should doubtless have heard many speculations as to what that uncouth monster could have been.

The Starling (*Sturnus vulgaris*, fig. 1164) breeds in the stumps of the old trees around us. In autumn they assemble, and migrate in large flocks from the marshes on the Thames.

We have the Bullfinch (*Pyrrhula vulgaris*, fig. 1165). This bird destroys the buds, but I do not think it has ever done us much harm. It is a charming bird: the one I have at home, which has been taught to pipe by an indefatigable German, delights me with his rich melodious voice whenever I tell him to sing me his song.

The Lesser Redpole (*Fringilla Linota*) comes to us in autumn. The common Linnet (*Fringilla cannabina*, fig. 1166) visits the garden in scanty numbers. This is peculiarly the poor man's bird. It appears to

FIG. 1164.—Starling.

FIG. 1165.—Bullfinch.

be much excited when it "pours forth his song in gushes," and I shall ever remember the delight which a caged bird, kept by a neighbour, afforded to me once when I was confined to bed for a few days.

"Books!—'tis a dull and endless strife:
Come, hear the woodland linnet,
How sweet his music! On my life
There's more of wisdom in it."—WORDSWORTH.

Only one or two of the beautiful Goldfinches (*Fringilla Carduelis*, fig. 1167) have been noticed. The Goldfinch has become much more scarce in the southern counties of England than it used to be. I have

FIG. 1166.—Linnet.

FIG. 1167.—Goldfinch.

formerly seen large flocks farther down, on the Brighton downs. One of the great charms of the redpole and of the goldfinch is the manner in which they use their feet as organs of prehension, holding the food in their feet whilst they take it with their beak.

The Hawfinch (*Fringilla Coccothraustes*, fig. 1168) visits us and probably occasionally breeds. An adult bird which was killed by flying against the orchard-house, appeared from the state of its plumage to have been nesting. The Greenfinch (*Fringilla Chloris*, fig. 1169) visits us in numbers. We have also at times the Mountain Finch (*Fringilla montefringilla*), the Black-headed Bunting (*Emberiza schœniculus*), and the Siskin (*Carduelis spinus*). Ben Jonson says, "The finches' carol."

FIG. 1168.—Hawfinch, ⅓th nat. size.

FIG. 1169.—Greenfinch.

The irrepressible House Sparrow (*Fringilla domestica*, fig. 1170) occasionally comes in large flocks, and then leaves us again. They do the garden little, if any, damage; though they know the time for feeding the poultry, when they always come down for their share.

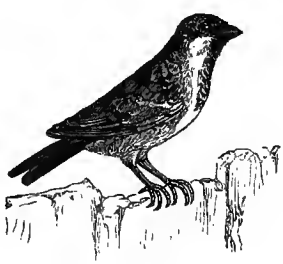


FIG. 1170.—House Sparrow.

FIG. 1171.—Chaffinch.

We have the Tree Sparrow (*Fringilla montana*) and the Chaffinch (*Fringilla cœlebs*, fig. 1171). The chaffinch arrives in large numbers in severe weather, but I cannot endorse the opinion of the Thuringians, who consider it to be the best of all singing birds. We have also at times the Yellow-hammer (*Emberiza citrinella*).

There are abundance of Sky-larks (*Alauda arvensis*, fig. 1172)—"gay lark of hope"—on the downs, but they rarely appear in our garden, to rejoice us with their "heaven-gate" song.

"Soon as Aurora lights the dawn,
The lark, at early hour,
Carols forth the rosy morn
High from its heavenward tower."—ANON.

The speciality of the lark is to sing when upon the wing, so that another poet well observes:—

"Higher still, and higher,
From the earth thou springest:
Like a cloud of fire
The blue deep thou wingest,
And singing still dost soar, and soaring ever singest."
SHELLEY.

Vast flocks of these birds cross over after snow, and fly in a south-west direction. The winter of 1870–71 was especially remarkable for the number and size of the flocks. The Wood-lark (*Alauda arborea*) has been heard about the place, but I have never observed it, though I have

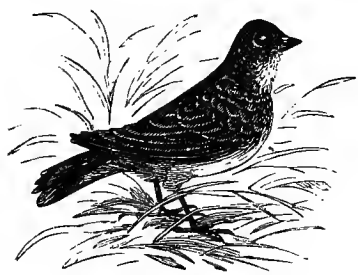


FIG. 1172.—Skylark.

FIG. 1173.—Wagtail.

heard its delightful note in the county, both at Richmond Park and at Weybridge. Its rich, melodious, although by no means varied song, is very exciting to some people, and there are many persons in London who are never without wood-larks, the song of which greatly delights me as I traverse the London streets.

The Meadow Pipit (*Anthus pratensis*) lives in our field. At least three species of Wagtail frequent my garden. The Pied Wagtail (*Motacilla Yarrelli*, fig. 1173) is our common species; the Grey-bearded

Wagtail (*Motacilla Boarula*) and Ray's Wagtail (*Motacilla Rayi*) have also been observed, but of these two latter I have no knowledge. The pied wagtails sometimes build their nests and rear their young in our garden; they are very ornamental, from their quick movements and rapid mode of running after the flies and insects on which they feed.

Five species of Titmice grace the garden with their presence. Sometimes they do good by destroying the insects, and sometimes they do much harm by devouring the fruit. They are charming birds,—particularly the Blue Titmice (*Parus cæruleus*, fig. 1174), which are most beautiful and interesting creatures. Twice a year they come to the garden in flocks: once in the early spring, when they pick

FIG. 1174.—Blue Titmouse, ½th nat. size.

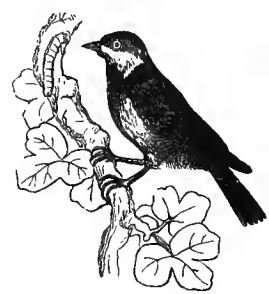


FIG. 1175.—Greater Titmouse.

out the blossom buds of the pear, and especially of the Doyenné d'Été; and again in the autumn, when the pears are full-grown, at which time they make a little hole in the fruit: thereby exposing it to the ravages of wasps or of other insects, or admitting the spores of fungi which cause it to prematurely rot. In this way a flock of titmice will destroy a large crop of fruit in two or three hours. In winter they do incalculable good by destroying the eggs of insects, and, later in the season, even the insects themselves. Regarding them simply from a utilitarian point of view, it is immaterial to me whether my plant is destroyed by a caterpillar or by a titmouse, so when they come as a devouring army my gardeners scare them away by firing upon them and killing one or two; and as all creatures are greatly terrified at the sight of the dead bodies of their own species, they

generally decamp forthwith to other places where they are not so cruelly treated.

We have also the Greater Titmouse (*Parus major*, fig. 1175), the Cole Tit (*Parus ater*, fig. 1176), the Marsh Tit (*Parus palustris*), and the Long-tailed Tit (*Parus caudatus*, fig. 1177). In the severe winter of 1870-71, when many of the small birds perished from cold and hunger, they were so pressed for food that they were readily caught in a trap baited with a piece of fat bacon. Several titmice

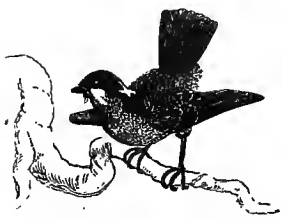


FIG. 1176.—Cole Titmouse.

FIG. 1177.—Long-tailed Titmouse.

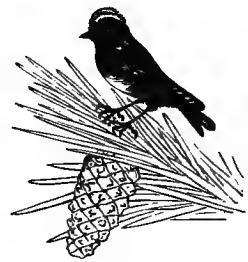


FIG. 1178.—Golden-crested Wren.

thus procured were placed by the gardener in the Fernery, where they enjoyed the genial temperature, and soon made themselves very much at home; they cleared every plant of aphis, coccus, or any other insect they could find, and when I had my luncheon were quite ready to share with me my frugal repast. But at the very earliest opportunity they proved themselves unthankful for the kindness shown to them, and flew away through the first crack in the glass they could find. The long-tailed titmouse is remarkable for the beauty of its long nest, which is greatly prized by boys.

The Golden-crested Wren (*Regulus cristatus*, fig. 1178) visits us, but I do not remember to have seen its suspended nest, which is generally fixed in a fir-tree. It is the smallest of all birds, and towards autumn congregates in the woods round London, at Weybridge, and also in Hertfordshire, where hundreds may frequently be observed flying from tree to tree, picking out every insect and every insect's egg they can find.

My garden is rich in Warblers. The Grasshopper Warbler (*Sylvia locustella*) has been heard. The Sedge Warbler (*Sylvia Phrag-*

mites, fig. 1179) constantly builds with us. This bird may be known by its note, which is repeated over and over again, and conveys the idea that it will never stop. It is a charming and right merry

FIG. 1179.—Sedge Warbler.

FIG. 1180.—Reed Warbler.

summer bird. The Reed Warbler (*Sylvia arundinacea,* fig. 1180) constantly builds with us. This bird appears to be able to vary the character of its nest, from its deep normal form (fig. 1181) to the shape shown in fig. 1182. The latter nest was built in a stiff bush (privet). Mr. W. H. Power has noticed the latter form

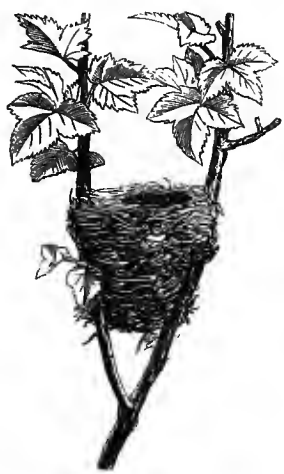


FIG. 1181.—Reed Warbler's Nest.

FIG. 1182.—Reed Warbler's Nest.

when the nest had been constructed in a lilac bush. He considers that the deep pendulous form is constructed to prevent the eggs being thrown out by the wind bending the slim, pliant reeds. The Blackcap (*Curruca atricapilla,* fig. 1183) has a note of good quality.

Besides these, we have the Garden Warbler (*Sylvia hortensis*), the Whitethroat (*Curruca cinerea*), the Lesser Whitethroat (*Curruca*

FIG. 1183.—Blackcap.

FIG. 1184.—Chiff-chaff.

sylviella), the Wood Warbler (*Sylvia sylvicola*), the Willow Warbler (*Sylvia Trochilus*), and the Chiff-chaff (*Sylvia rufa*, fig. 1184).

Lastly, above all the other warblers, and unquestionably superior in song to any other feathered visitor of my garden, the Nightingale (*Philomela Luscinia*, fig. 1185) charms us with its sweet melody.

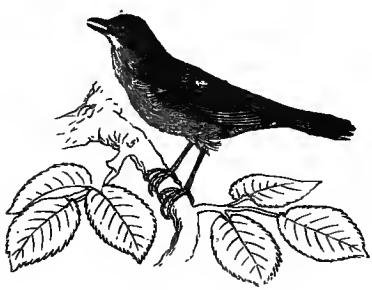


FIG. 1185.—Nightingale.

"Sweet bird, that shunn'st the noise of folly
Most musical, most melancholy,
Thee, chauntress, oft the woods among
I woo, to hear thy evening song."

MILTON.

The neighbours tell me that before I occupied my garden the nightingale was never known to visit the field, so doubtless the shrubs and little trees which have been planted are an attraction.

"Where nightingales their love-sick ditty sing:
See, meads with purling streams, with flowers the ground,
The grottoes cool, with shady poplars crown'd!"

DRYDEN.

Nightingales arrive about the middle of April in each year. They are not so common in the valley of the Wandle as they are in the valley of the Darenth and in many parts of Essex. They are not so plentiful at Florence as they are in England, but on the Lake of

Belinzona their voices resound from every bush, and in the Eternal City they are carefully tended in cages.

"O nightingale, that on yon blooming spray
Warblest at eve, when all the woods are still,
Thou with fresh hope the lover's heart dost fill,
While the jolly Hours lead on propitious May."—MILTON.

A pair of Stonechats (*Saxicola rubicola*, fig. 1186) roosted for nearly a month on the bulrushes in the mill-head during the autumn of 1870, but this bird is rather a resident on commons than among

FIG. 1186.—Stonechat.

FIG. 1187.—Wheatear.

the shrubs of gardens. It may be known by its cry, which resembles the noise of two stones being struck together. The Whinchat (*Saxicola rubetra*) and the Wheatear (*Saxicola œnanthe*, fig. 1187), although they have not been observed in my garden, are to be found in the neighbourhood, on Mitcham Common.

The Hedge Sparrow (*Accentor modularis*) may be observed flitting about from bush to bush; but from its quiet unobtrusive manner, and the unpretending and sober colour of its plumage, frequently escapes the notice of the casual observer.

FIG. 1188.—Redbreast.

After the nightingale, there is no soft-billed bird more charming than the Robin (*Erythaca rubecula*, fig. 1188). I delight in the clear shrill of the Redbreast, and love him most dearly, but I cannot convey my enthusiasm to other people, as few will admit that they care for the note of this bird, although no one will deny that they admire his

form and his action. Redbreasts breed with us, and are as familiar as they are in most other gardens. One always accompanies me when I am at work, and pounces upon the turned-up worm, and then sits upon the nearest branch watching my operations, giving me at intervals strophes of his high-pitched song.

> "Here in safe covert, on the shallow snow,
> And, sometimes, on a speck of visible earth,
> The redbreast near me hopp'd."—WORDSWORTH.

One dear little robin used to perch upon the table while I lunched, to receive his share of the bread-crumbs. Sometimes, in cold weather, we catch a robin and place him in the Fernery to eat any insects which may be there.

We never can have too many of the soft-billed birds in the garden, and we rigidly protect their nests and eggs from all intruders.

FIG. 1189.—Missel Thrush.

FIG. 1190.—Fieldfare.

Missel Thrushes (*Turdus viscivorus*, fig. 1189) live around us, especially in the Park. The Fieldfare (*Turdus pilaris*, fig. 1190) visits us in autumn. The Redwing (*Turdus Iliaca*, fig. 1191) has of late years become much more numerous round London, and in some winters visits our neighbourhood in considerable numbers.

The two birds which really, upon the whole, are the best songsters which build in my garden, where they exist in large numbers, are the Song Thrush (*Turdus musicus*, fig. 1192) and the Blackbird (*Turdus merula*, fig. 1193).

The song thrush sings from November till August. It is one of our most joyous songsters, beginning to sing early in the morning and continuing till late at night. The poet Browning, speaking of this bird, says—

"The wise thrush
. . . sings each song twice over,
Lest you should think he never could recapture
The first fine careless rapture."

FIG. 1191.—Redwing, ½th nat. size.

FIG. 1192.—Song Thrush, ½th nat. size.

The thrush builds constantly in my garden, and in early spring prefers the *Cedrus deodara*, or some other evergreen tree. It always lines its nest with mud, and thus differs from the blackbird—

"The ouzel-cock, so black of hue,
With orange-tawny bill" (SHAKSPEARE)—

which first lines its nest with mud, and over this places dried grass. The poet Burns highly appreciated the note of this bird in January, and who does not, when the sun shines on the snowdrop?

"Sing on, sweet thrush, upon the leafless bough!
Sing on, sweet bird! I listen to thy strain;
See, aged Winter, 'mid his surly reign,
At thy blithe carol clears his furrow'd brow."—BURNS.

The blackbird has a far softer and more melodious note than the thrush, but the note of the latter bird is more powerful and his song more constant. Together they form a delightful harmony, but they more commonly sing alone than together. This country would be

shorn of half its pleasure if we were deprived of the notes of the thrush and the blackbird.

"The mavis mild wi' many a note
Sings drowsy day to rest."—BURNS.

FIG. 1193.—Blackbird, ¼th nat. size.

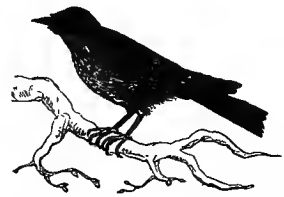


FIG. 1194.—Spotted Flycatcher.

The Spotted Fly-catcher (*Muscicapa Grisola*, fig. 1194)—the last bird of the summer to migrate, and the last to make its appearance here—builds in the willow-trees on our islands. It hawks over the

FIG. 1195.—Kestrel.

FIG. 1196.—White Owl.

water, returns and settles on a bough, then hawks again, and so on over and over again. It arrives about the second week in May.

The only birds of prey which have been noticed with us are

the Kestrel (*Tinnunculus Falco*, fig. 1195), the Sparrow Hawk (*Falco nisus*), and the White Owl (*Strix flammæa*, fig. 1196)—

"The ill-faced owl, Death's dreadful messenger" (SPENSER);

or, as Shakspeare has it—

"The clamorous owl that nightly hoots:"

At Shepley House, in 1872, a pair bred in an old tree, and about eighteen heads of ducklings were found in their nest.

The constant persecution of raptorial birds by gamekeepers has terribly thinned this country of this family. It is probable that they are useful in destroying diseased and maimed birds, and preventing the overcrowding of species, and it is questionable whether the general balance of nature can be disturbed with impunity by the caprice of ignorant and prejudiced men.

In the woods on the hills, the Hen Harrier (*Circus cyaneus*), the Hobby (*Falco subbuteo*), and the Merlin (*Falco æsalon*), have been shot.

A splendid wild Cockatoo was unfortunately shot this year (1872) in Beddington Park, possibly from Weybridge, where attempts have been made to acclimatize the parrot tribes.

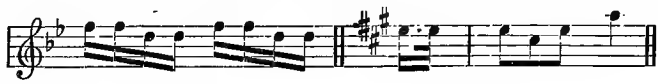
The following table has been prepared by my son, to show about the time when the birds mentioned arrive at my garden: the exact day varies in each year:—

Blackcap	March 30th.	House Martin	April 16th.
Chiffchaff	April 5th.	Cuckoo	„ 18th.
Swallow	„ 6th.	Summer Snipe	„ 22nd.
Sand Martin	„ 8th.	Sandpiper	„ „
Wryneck	„ 9th.	Swift	May 10th.
Nightingale	„ 12th.	Flycatcher	„ 18th.
Sedge Warbler	„ 15th	Land Rail	„ 25th.

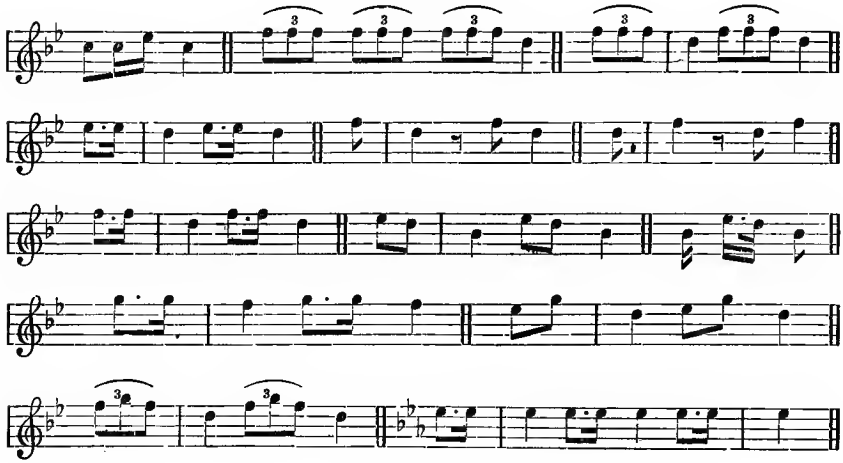
Although birds delight us with their song, yet in my intercourse with musical men I have found but few that have the power of recording their notes. I therefore requested my brother, Mr. F. Smee, to visit my garden and endeavour to take down the notes of the birds as they sang. He reported that some of their musical

phrases were in the minor key, and I have printed several of the strophes as they were sung.

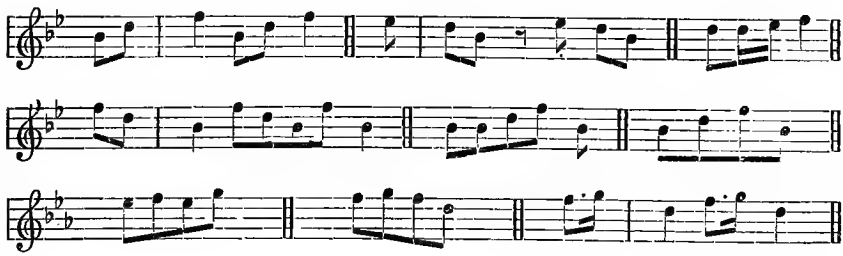
The Reed Warbler.



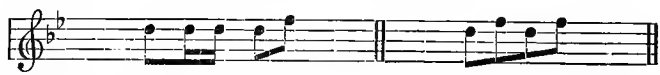
The Thrush.



The Blackbird.



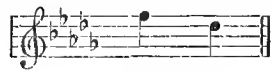
Birds unknown.



"The birds their quire apply; airs, vernal airs,
Breathing the smell of field and grove, attune
The trembling leaves."—MILTON.

In large gardens it is difficult to collect friends together, or to call the gardener. I find that this is best done by a garden cry, which is essentially the cuckoo's note. When employed in serious earnest, it can be recognized nearly a mile off. I have tested it in the stillness on the glaciers against the cry of the Alpine guides, but an Australian lady on a visit to my garden declared the "Cowi, cowi" whch is so essential to collect parties in Australian woods to be preferable, but on this point we must make further trial.

The Garden Cry.



Heigh ho!

Gilbert White states that Owls hoot in B flat. Gardner, in his curious work entitled "Music of Nature," has recorded the notes of many birds, and it will be observed that many strophes which my brother has supplied are identical with those before given by Gardner, which proves the truth of both observers. A garden without birds is like a mansion without inhabitants; and at all times, and under most conditions of the nervous system, their song inspires a oothing, melancholy joy.

"Harde is his heart that loveth nought
In May, whan all this mirth is wrought."—CHAUCER.

Vign. XXVI.—Portrait of Gyp.

Vign. XXVII.—Scene on the Wandle.

CHAPTER XIV.

THE CLIMATE AND SPRING FROSTS.

"And hour by hour, when the air was still,
The vapours arose which have strength to kill:
At morn they were seen, at noon they were felt,
At night they were darkness no star could melt."

SHELLEY.

THE Climate of my garden is peculiar. Water from the depths of the earth flows to the surface, and runs through the little streams at a higher temperature than the atmosphere in winter, and at a lower in summer. This condition has a tendency in early winter to prevent the plants from going to rest; in early spring it brings them forward earlier than in other districts near London; but when the sun obtains more power in May and June, some districts are more forward in their vegetation than ours are. In the coldest winters the frost rarely penetrates to any depth on the north bank of the river, though on the south bank it freezes as deeply as in other places. When covered with snow, the earth is rarely frozen more than an inch in depth. The thermometer frequently rises higher during the day and falls lower at night than in other situations, a condition unfavourable to vegetation.

Sometimes frosts occur in March, freezing spring flowers; at others they destroy the peas in flower in April. May frosts, however, are the especial terror of the gardener, and usually occur in the third week of May. In the year 1867, an exceedingly severe frost occurred as late

as the 23rd or 24th of May, of which I made a particular observation, and recorded the result in the "Gardeners' Chronicle," [1] which is perhaps sufficiently interesting to repeat:—

THE GREAT MAY FROST OF 1867.

"During the last two nights a most destructive frost, considering the season of the year, has occurred, and I have been induced to make a minute investigation in my own garden at Wallington to ascertain the probable damage the country has sustained therefrom. All trees, except the catalpa, the ash, and mulberry, are in full leaf, the young shoots of which, especially of the latter, have suffered. Besides these the young shoots of the walnut, yew, holly, and ivy, are much damaged, and those of the laburnum slightly. The leaves of all other trees have escaped. The oak frequently suffers from May frosts, but this year, in my grounds, it is not injured, probably because the leaves are forward and capable of resisting cold. A very large crop of apples is destroyed, the fruit being completely frozen through. The largest apples in my grounds are those of the Irish Peach, some of which are larger than marbles. Some are saved, but many are destroyed. The state of the crop varies from this condition to trees now in flower of the Court-pendu Plat; and over a collection of about 300 distinct kinds, nearly all the young apples have perished. The leaves of the Siberian Crab are damaged. Medlars appear secure, and possibly quinces may not be destroyed where the fruit is not set. Pears did not set well this year; and of those that did, very few in a collection of over 200 kinds will come to perfection, nearly all being killed. The crop of plums was unusually large, but hardly one is left of about fifty kinds. Curiously enough, the outdoor peaches, nectarines, and almonds appear uninjured. Cherries also promised an enormous crop, but of fifteen kinds every one, whether late or early, appears to be utterly disorganized. The aspect of the Morello cherries is particularly pitiable. Gooseberries have partially suffered

[1] The "Gardeners' Chronicle," June 1st, 1867.

where exposed. All kinds of currants are uninjured where covered by leaves, but where exposed are killed. Strawberries are in great part ruined. The Black Prince, about half-grown, the Keen's Seedling, well formed, the British Queen, and the Alpine strawberries, have been frozen; probably later flowerers, and later kinds not in flower, have escaped. The first fruit of the raspberries is frozen, but the blossoms and buds are uninjured. Figs, plums, peaches, nectarines, apricots, apples, pears, and strawberries in the orchard-house are safe, and strawberries now ripe in cold frames escaped injury. The havoc in the vegetable garden has been equally great. French beans and scarlet runners are destroyed. Perhaps, however, the latter may shoot again. This is a misfortune which the cottager will especially feel. Broad beans, November planted, which have withstood the last winter, have their young pods frozen, and in some cases the stalks are bent over as though broken. The spring-sown, now in flower, are similarly damaged. Peas November-planted, and yielding their first crop this day, show marks of frost, and young pods of Sangster's No. 1, spring-planted, are completely destroyed; Champions are also injured in the haulm, but all later crops are safe. Potato plants, from 1½ feet high, with incipient tubers, to those of the first growth, are completely destroyed, and also those grown in frames, and now ripe, have had their leaves frozen, the glass having been removed. The tubers in this case are perfect. The early cauliflowers somewhat flag, but lettuces and all other crops are safe. The curious new vegetable, the *Raphanus caudatus* of Japan, has defied the freezing blast. In the flower-garden, pelargoniums, fuchsias, heliotropes, are destroyed in open spots; and dahlia roots, which withstood the severe winter, and have since sprouted about a foot high, are cut down like the potato-haulm. Azaleas in great beauty last Thursday, and many kinds of English orchids in flower, have had their blooms utterly destroyed. Alpine plants remain intact. Roses have remarkably escaped; even the tea-scented, the Noisette, and monthly roses show no signs of damage. The hybrid perpetuals, now budding, and the Scotch, commencing to flower, have not felt the cold. Of English ferns,

the lady fern and mountain fern have suffered most severely, some having been utterly ruined, and others more or less disfigured. The brake fern, male fern, broad fern, shield fern, hard fern, and hart's-tongue, and some flowering ferns, have had some of the tops of their fronds frosted, and are consequently damaged for the season. On the contrary, the oak, beech, and limestone fern, the holly fern, the marsh fern, the hay-scented fern, the parsley fern, and all the aspleniums, have stood their ground. Amongst foreign ferns, young fronds of *Hypolepis repens* and of *Woodwardia radicans* and *orientalis* have suffered; but North American ferns have entirely escaped, and the frail and delicate fronds of *Adiantum pedatum* have not cared for the vicissitudes between the 1st of March and the present time. There is no outdoor vine on my premises, but in the neighbourhood some had their young shoots utterly destroyed, some are partially injured, and others have not suffered. The Chinese banana has its leaves considerably frosted. I made a minute inspection on Thursday evening, May 23, fearing mischief, but all was safe and exhibited the glorious beauty of spring, but between this and Saturday morning, May 25, this unprecedented damage was done. Gardeners always dread May frosts. History and individual experience abound in examples of damage, and therefore the present instance simply stands out as one of intensity of degree and lateness of occurrence. May frosts must be regarded as a phenomenon of nature unexplained and philosophically unexplainable; but nevertheless to be acknowledged, feared, and practically dealt with. All we can say is, that the frosty blast of May has passed over Europe this year with unusual severity, and doubtless will be hereafter described as 'the great May frost of 1867.'"

Very few years pass by without May frosts on two or three nights, and sometimes the oaks in full leaf have their young shoots absolutely frozen and destroyed. Sometimes the days are hot when these frosts occur, and it is lamentable to see how much damage is done. This may be ascertained by a careful examination of the

flower, when the stamens and stigmas will be instantly observed to be frozen and disorganized (fig. 1197). The regularity of the occurrence of these frosts is such as to lead to the conclusion that they arise from some cause which we do not understand. We may fairly anticipate their recurrence, and gardeners should always watch for them, and refrain from planting out delicate plants till they have passed over.

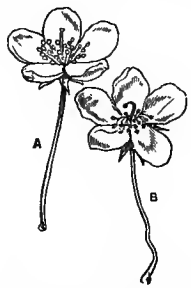


FIG. 1197.—Effect of Frost on Cherry Blossoms. (A. Unfrosted; B. Frosted stamens and stigmas destroyed.)

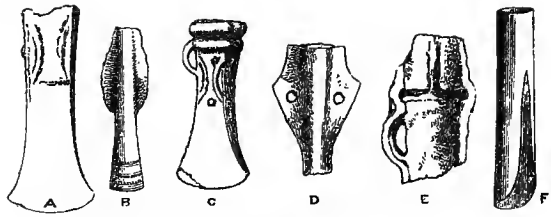
In June summer fairly commences, and from this time tropical plants will live and thrive out of doors till the equinoctial gales bring our short summer to its close. After these gales the weather is usually lovely in the first half of October, when night frosts occur, killing our kidney-beans and indicating that winter is at hand. After these frosts the weather again is mild till the middle of November, when sharp frosts pretty constantly occur; after which, in most years, the weather is mild till Christmas. The year 1871, however, was an exception, there being severe frosts in December. In November and the first half of December dripping fogs come on, which bathe every blade of grass in moisture, which never dries while they last. This is hurtful to vegetation, and when associated with frost is more injurious to plants than a drier and a colder atmosphere. Violet leaves, for example, rot when exposed to this moisture, but when sheltered by an evergreen tree retain their perfect foliage.

When Christmas has passed, the days become brighter, the fogs are dissipated, and the new year opens with the Christmas rose and the naked-flowered jasmine. Within a few days snowdrops spring up, followed by the crocus, and by the middle of March the bulbous plants afford a blaze of beauty. Fruit-trees then display their bloom; almonds, apricots, and plums precede cherries, pears, and apples; whilst mulberries, walnuts, and elderberries bring up the rear.

Our fruit season commences in May with frame strawberries in abundance, followed at the close of the month by forced apples and pears as curiosities. Outdoor strawberries ripen in the beginning of

June, cherries about the middle, and towards the end of the month gooseberries and currants. In July our frames yield us melons, and our Poor Man's house grapes. At the end of the month the early crops of pears, apples, and plums ripen, and the Orchard-house yields us peaches, nectarines, and apricots. During May and June Nature delights in activity, every tree, shrub, and plant growing with rapidity and energy. This continues more or less, according to the species, when vegetation comes to a remarkable standstill in August, but ripens its wood for the fruit of the next year, and then we sow the seed of lettuces, onions, and cauliflowers to stand the winter. The leaves begin to drop in the middle of October, and the trees are bare by the end of November. The mosses and lichens, following the saxifrages, continue their growth throughout the winter. The snow-clad ground beside the bright water of the river, and overhung by the beautiful tracery of the leafless trees, affords a picture of another kind to gladden our hearts and make us thankful for the glorious perfection of Nature, which even amidst frost and snow is charming and beautiful.

Vign. XXVIII.—Bridge over the Wandle.



Vign. XXIX.—Bronze Celts found in Beddington Park.

CHAPTER XV.

GARDENS OF VARIOUS NATIONS.

LORD BACON, the great philosopher of the sixteenth century, has shown his high appreciation for gardens by saying, that "God Almighty first planted a garden, and indeed it is the purest of human pleasures; it is the greatest refreshment to the spirits of man, without which buildings and palaces are but gross handiworks." And we find that the same sentiment, though differently expressed, may be traced in the writings of the most ancient authors. For we learn from history that gardens have existed from the earliest times on record; although with different nations,—as with individuals,—the same profound feeling for Nature does not prevail, neither does the same disposition to cultivate plots of ground for the growth of plants. More especially can this be seen in the various manners which different nations,—or even different individuals of the same nation,—have in their mode of laying out gardens. "My Garden," as previously observed, was planted by myself; and though, like the great philosopher I have just quoted, I have ever found it to be "the greatest refreshment to the spirits," yet, as well as for recreation, I have formed mine also for study and produce:—"In lucem lucrum ludum."

Among the oldest gardens on record are those belonging to the ancient Egyptians. These were often of considerable size, and were generally irrigated by canals communicating with the Nile. In them, beneath the shade of trees, large tanks or basins were placed; and,

not unfrequently, there were also large ponds on which the Egyptians amused themselves by being rowed about in pleasure boats,—or with their favourite pastime, by spearing the fish with which these pieces of water were stocked. The ancient Egyptians used to lay out a part of their gardens in walks shaded by trees planted in rows. The roots of these trees were kept moist by the base of their stems being banked round with earth, and thus the water was retained, as the mound was made lower in the centre than at the circumference. Whether the trees were clipped into forms or were allowed to grow naturally, it is impossible to say with any certainty; for what we know about the gardens of this people of antiquity is mostly learnt from the sculptures or paintings of Thebes. We certainly there find trees represented as growing in a free and natural manner, although against this, again, trees are also depicted in very peculiar forms, leading one to suppose that the Egyptians knew the "*ars topiaria*" long before the Romans.

The different parts of their large gardens were severally allotted to the vineyard, orchard, kitchen and flower-garden. In Rosellini's valuable work on the "Monuments of Egypt and of Nubia" is a very interesting representation of an ancient Egyptian garden which must have existed nearly 1500 years before the Christian era, as it is said to have belonged to a military chief—from whose tomb at Thebes it is copied—in the reign of Pharaoh Amenof II., the sixth king of the eighteenth dynasty. Doubtless the plan of this garden may be taken as an ideal of what were all the other large ones of that nation. Its form is a large square, which is enclosed on all sides by jagged walls. A river or canal flows on the right side; and this is shaded by an avenue of trees. In the middle of this is a road which leads to the principal entrance, beyond which is an outer gate, or rather a passage, flanked with trees. Beyond this again is a little gate leading to the vineyard which occupies the centre of the garden. Within the quadrangle are trees, such as date palms and sycamores, planted in regular alternation, this being the custom in Egypt. Leading to and from this vineyard are other small alleys, which are more especially intended

for giving shade to the four tanks or basins placed opposite to each other. These tanks or basins are surrounded by a turf border, and near them tufts of papyrus are depicted as growing in regular order in large vases. To the left of the vineyard are situated the tombs, near which are two temples, surrounded at their base by a sort of balustrade. The deity who was said to preside over the ancient Egyptian gardens was called Khem, and is supposed to answer to the Grecian Pan. They were also under the protection of Ramo, a goddess sometimes represented as an asp, and sometimes as having the body of a human being and the head of that serpent. Near the temples in this garden is the dwelling-house, which there is no need here to describe.

The plan of this garden, although in the highest degree curious from its having been formed more than three thousand years ago, must have been very different from what our present notions and tastes would require. No person who laid his garden out on the above-mentioned plan would be considered, at the present time, an ardent lover of nature; yet the ancient Egyptians are said to have been extremely fond of plants and flowers, and cultivated all the varieties that they could obtain: so much so, indeed, that it is said they even exacted contributions of rare and foreign plants from nations subjected by them. Wreaths and chaplets were common among them; their bowls of wine were commonly crowned with wreaths of flowers, and flowers were placed on the table before the host. Indeed at their entertainments extravagant sums of money were not unfrequently expended on flowers for decorations. Pliny tells us that it is to this nation that we are indebted for the invention of artificial flowers, which were known by the name of "Ægyptiæ." Probably much time was spent by this people in the cool and shade of their gardens; their "kiosks," or summer-houses, seem by the representations of them on the tombs to have been frequently of great size.

With the vines, figs and other trees grew. Rows of columns, sometimes painted, and which supported wooden rafters, divided the vineyard into numerous avenues. The vines were either kept as low bushes or

formed into a series of bowers; but they do not appear to have been ever trained, as in Italy, upon trees. In the sculptures of Thebes, monkeys are represented in the fruit-trees handing down the figs to the gardeners below; from the same source we see these animals refreshing themselves for their labour, much to the annoyance of the men.

Though the ancient Egyptians paid such regard to the cultivation of plants, yet at the present time but little love is shown for them by that nation; trees and plants being principally grown merely for the purposes of food, and but rarely for the ornamentation of grounds; indeed few timber-trees are now to be seen in that country. Some of the richer inhabitants have gardens, yet they are indifferently kept up, showing that no enthusiasm is manifested for them. There is one at Schoobra, belonging to the Pacha, which is the most interesting of all of them. Its situation is about four miles north of Cairo, and it is approached by an avenue of mulberrry and acacia trees, which have been recently planted. This garden is laid out in a formal manner, the walks radiating from centres to different parts of the grounds. Around a fountain is a covered corridor, with "kiosks" or summer-houses projecting into the water. Near the palace is the "É Gebel," or "the Hill," where there is another kiosk. This hill is ascended on two of its sides by a flight of steps, and the summer-house rises above a series of terraces planted with flowers and commands a view of the whole garden, of the Nile, and of the hills in the distance. But there is no considerable beauty in the arrangement of this garden, neither is there any great variety of flowers growing in it. I have simply mentioned it as showing the low ebb to which the cultivation of plants has sunk in the same nation that in former times took so deep an interest in them. And this leads one to infer that climate has not so much effect on the art of gardening as has the disposition of the people themselves.

Certain great nations of antiquity, such as Assyria, and more especially Babylon, constructed their gardens on a stupendous scale. These may be strictly termed architectural gardens, and, of all others, present a complete antithesis to "My Garden." In all their works

those nations left an individuality and a grandeur not to be surpassed, and this was also extended to the plan of their gardens. The one attached to the palace at Babylon—which is considered to have been formed by Nebuchadnezzar out of compliance to his queen Amytis, who wished to possess elevated groves in imitation of the hills of her native country, Ecbatana—may be considered as a type on a large scale of what were the gardens of Nineveh, Persepolis, or the one mentioned in the Book of Esther as belonging to King Ahasuerus. These "Hanging Gardens" of Babylon, as they are called, were contained in a square of four hundred feet, the base of which occupied four acres, and they were composed of several terraces, which rose one above the other until the highest one overtopped the walls of the city, these being more than three hundred feet high. The several terraces were reached by flights of steps; and the terraces themselves were each supported on large vaults built one upon another, which were strengthened by a wall twenty-two feet thick; these vaults were covered with flat stones sixteen feet long and four wide, and upon them were placed rushes bound with a considerable quantity of bitumen, upon which were placed two beds of burnt bricks covered with sheets of solid lead to prevent leakage from the moisture of the earth which was the uppermost layer. At the base of these gardens flowed the Euphrates, or rather a canal issuing from that river, and on the highest terrace was placed an aqueduct, the water for which was pumped up from the river, so that there was no lack of water for the plants. This upper terrace commanded an extensive view of the city and of the surrounding country; and this, as well as the others, was laid out in parterres, with flowers and shrubs, and trees and fountains, and seats and banqueting-halls. In order that large trees should thrive on these terraces, large hollow piers were built and filled with mould, so as to enable the roots to have sufficient earth and moisture.

Such is the account handed down to us of the "Hanging Gardens" of Babylon, one of the greatest wonders of the world, and which must have been constructed five or six hundred years before the

Christian era. Besides these royal gardens, it is surmised that there were others on the banks of the Euphrates, where, beneath the willow-trees, the Israelites sat down and wept. In a letter which the prophet Jeremiah wrote to the captives at Babylon he says: "Build ye houses, and dwell in them; and plant gardens, and eat the fruit of them;" but I know not whether his sage advice was attended to by them. At Nineveh we learn from good authorities that gardens are considered to have been within the city walls, and that private houses, which occupied the space between the great public edifices, stood in the midst of gardens, some being of considerable extent. The exact manner in which these were laid out cannot be known, although we may infer that in that stiff and formal age conventionality would be more studied than the beautiful freedom of nature. In the vaults of the British Museum is a bas-relief which evidently represents the gardens of one of the Assyrian kings. It consists of trees, and in the centre a long walk leads upwards to an altar, and at regular distances canals intersect the grounds. The date of this garden must have been about 1200 B.C. Near to the above mentioned bas-relief is another from the same country, and therefore of the same age; this shows vines, palms, and other trees, a plant in bloom, and in the middle is a man with two dogs: and on another stone is a representation of an Assyrian bower composed of vines, in which sit the King Askarbebul and his queen Thus we see that this belligerent nation—as were the Assyrians—were not wholly devoid of love for nature, although our knowledge of the extent to which it was carried must necessarily be very meagre. Diodorus tells us of the garden that Semiramis—who lived, it is said, B.C. 2182—made at the foot of the mountain Bagistan. He gives the size of it as being twelve furlongs in compass; according to him, the whole of it was watered by a great fountain: towards one of its sides were steep rocks, seventeen furlongs from the top to the bottom. The fame of this garden was so great that Alexander the Great, on his journey from Kelone to Nysæa, went out of his way in order to visit it. Observing a "great and high rock"

near to Chaone, a city of Media, this remarkable woman Semiramis made "another very great garden" in the very middle of it, and built upon it "stately houses of pleasures;" "whence," says the historian just quoted, "she might both have a delightful prospect into the garden, and view the army as it lay encamped below in the plain."

Let us pass now from these formal gardens to those of another nation, equally great with the nations above mentioned, and with whom their history is intimately associated,—namely, the Jews. Among this nation we find that the most profound love for Nature existed, as is shown in their poetry and in the cultivation of gardens, which not only were places of resort for conviviality, but which also were used as places of interment, as places of devotion, as well as sometimes for idolatrous worship. These gardens of Palestine were enclosures on the suburbs of towns, and were surrounded by hedges of thorn or walls of stone. To protect these enclosures from robbers or wild beasts watch-towers or lodges were erected, in which was a keeper. In the time of the Romans the gardens of Syria were celebrated for their extreme fertility; in them grew various flowers and aromatic plants, olives, fig-trees, nuts or walnuts, pomegranates, and numerous other kinds of fruit-trees. In the kitchen garden many sorts of vegetals were grown, among which may be named the cucumber, lettuce, endive, mustard-plant, rue, garlic, and onions. The art of grafting appears to have been known by the Hebrews, but, because the propagation of mixed species was specially forbidden in the Book of Leviticus, stringent laws were made in the Mishna against even the grafting of trees on others of different kinds. The Hebrews seem also to have been conversant with the propagation of plants by cuttings or layers. Water was obtained for the gardens by means of channels or conduits; these being supplied by streams in the vicinity.

Near to Bethlehem, "in the long vale of Urtâs," Solomon nearly three thousand years ago "planted him vineyards, and made him gardens and a 'paradise,' and planted trees in them of all kinds of fruits, and made him reservoirs of water to water therewith the wood that bringeth forth trees." These pools or reservoirs still remain.

The form of the garden was quadrangular, and Dean Stanley informs us that it was probably here, "more than anywhere else, the wise king cultivated his knowledge of trees, from the transplanted cedar to the native hyssop." In this garden of Solomon grew the choicest and rarest of plants: "orchards of pomegranates with pleasant fruits;" "camphire with spikenard;" also "saffron, calamus, and cinnamon, with all trees of frankincense, myrrh and aloes, with all the chief spices."

Damascus has ever been celebrated for its gardens, which in the time of Maundrell extended to more than thirty miles round. The same authority also gives a curious description of their garden walls, "which are," says he, "built of great pieces of earth, made in the fashion of brick, and hardened in the sun. In their dimensions they are two yards long each, and somewhat more than one broad, and half a yard thick. Two rows of these placed edgeways one upon another make a cheap, expeditious, and in this dry country endurable wall." William de Bouldesall, in the fourteenth century, wrote that he was much astonished with the gardens about this place, which according to him amounted to no less than 40,000, and many other authors speak of them with admiration. Here, too, roses are largely cultivated for the making of the celebrated attar of roses. Probably, "the old interpretation" of Nazareth, as "Flowery," is derived from this village being, as Dean Stanley terms it, "a rich and beautiful field in the midst of green hills, abounding in gay flowers, in fig-trees, small gardens, hedges of the prickly pear; and the dense rich grass affords an abundant pasture."

At Jerusalem the wealthy citizens had their gardens without the city walls; and they were very numerous, extending to the Mount of Olives. With the exception of the rose gardens, which are said to have existed in the days of the Prophets, none were allowed within the city, on account of the unhealthy effect that was considered to be produced from the putrefaction of weeds and of other offensive substances. The site of the garden of Gethsemane has given rise to dispute. In a modern garden enclosure there are eight aged olive-trees, which are by some considered to have originally stood in the most memorable

and holy of places. Others again doubt the fact, on the ground that Josephus states in his History of the Jews that all the trees surrounding Jerusalem were cut down by the order of Titus during the siege of the city.

The plain of Gennesar, or Gennesareth—or, as its name implies, the "Gardens of Princes"—is, according to Dean Stanley, "truly the paradise or garden of Northern Palestine,"—so rich and fertile is its valley. Many other parts in Palestine might be enumerated for the gardens that are therein situated, but as my purpose is not so much to describe the different ones separately as to show the manner which the art of gardening was carried on by different nations, —the differences of style in the formation of the several gardens, so as to contrast them with "My Garden,"—I will therefore merely add, before I pass on to speak of the parks of Central and Southern Asia, that the gardens of balsams (which plants, Pliny tells us, only grew in his time in two royal ones in Judæa) and the palm-groves given by Antony to Cleopatra were at Jericho.

The paradises of the Persians have ever been celebrated, and have been copied by various nations of the West. In these first parks grew various sorts of trees, among which the cypress may more especially be named, on account of its being planted around the sacred precincts of the temples; and on account of its form bearing a strong resemblance to that of the flame of fire—after the doctrine of Zoroaster (Zerduscht) became enforced. In the early part of the Persian history we find that nation having a special predilection for the cultivation of plants, their most puissant monarchs not thinking it beneath their dignity themselves to plan their parks, and even to plant the trees and plants in them. Xenophon shows this more particularly in his "Œconomicus," in the following interesting account of a conversation which he there gives as taking place between Cyrus the Younger, king of Persia, and Lysander the Greek general, in the park belonging to the former personage at Sardis: "When Lysander expressed his admiration of it, of the fine trees, the regularity with which they were planted, how straight the rows were of them, how elegantly all the rows of them formed angles with

one another, while many sweet odours attended on Lysander and Cyrus as they walked about admiring all this, he said, 'I look with astonishment on all these trees on account of their beauty, but am still more astonished at the art of him who measured out the ground, and arranged them all for you.' Cyrus on hearing this was delighted, and said, 'It was I, let me say, Lysander, that measured the ground and arranged all the trees myself; and these are some of them,' he added, 'that I planted with my own hand.'"

These parks must sometimes have been very extensive, for the same author mentions another through which flowed the river Mæander, adjoining a palace of the same Cyrus at Celænæ—a city of Phrygia—as being full of wild beasts which that monarch was accustomed to hunt on horseback. Here also Cyrus once held a review of the Greeks, the number of whom amounted to 11,000 heavy-armed troops, and about 2,000 peltasts.

Not only were large trees grown in these Asiatic paradises, but also flowers. For in another part of Xenophon's "Œconomicus," Socrates is represented to be instructing Clitobulus—the son of Crito, a very rich man—on the management of a farm and household. "The king of Persia," says he, "in whatever provinces he resides, and wheresoever he travels, takes care that there may be gardens, such as are called *paradeisoi*, stocked with everything good and valuable that the soil will produce; and in these gardens he himself spends the greatest part of his time, whenever the season of the year does not prevent him." From Pliny we learn that the trees were planted in straight lines and regular figures, and that the borders of the walks were filled with flowers and flowering shrubs. To Persia we owe most of our beautiful flowers; in that country they come up, as it were, spontaneously. It is, too, the home of roses. No wonder, then, the literature of that country abounds in panegyrics to flowers, and is replete even to satiety. The four paradises more especially mentioned by the Persian poets were situated at Samarkand, in the valley of Soghd, at the Ghůtah or plain of Damascus, the Sháabi-Bowan near Kaléh Sofid in Társ, and in the glade of Máshán

at Hamadan. Another spot which Sir Henry Rawlinson tells us was intimately associated with these paradises, was the vale of Khosran Sháh, situated about eight miles from Sirdarud, and which, according to him, is a mass of groves and gardens.

But the art of gardening among the Persians at the present day, as among the Egyptians, seems to be on the wane. No country has greater advantages—no country possesses such a variety of beautiful, showy, fragrant flowers indigenous to the soil. It is, however, for the sake of coolness, and for the enjoyment of seclusion, and not for the sake of studying the habits of the vegetal kingdom, that gardens are kept in modern Persia. They generally consist of long parallel walks shaded by even rows of planes and fruit-trees and flowering shrubs, and in them are fountains and rills—these are the great desiderata, the water for them being brought from great distances at a considerable cost. Flowers of the most gaudy and of the most fragrant description are of course in abundance in this land of flowers. At Ispahan most of the citizens keep gardens, and the environs of Tabriz comprise a great extent of them, the circuit of which, in 1838, was calculated by Sir Henry Rawlinson to be no less than thirty miles. A glowing description of the royal gardens of Tackt-i-Kajer and of Negauristan at Teheran is given by Sir Robert Ker Porter. He especially speaks with admiration of the shaded and secluded walks, of the fountains, of the nightingales, and last, but not least, of the loveliness and of the exquisite perfume of the rose-trees, as well as of the other flowers and shrubs. In Persia, he tells us, the gardens and courts are crowded with the plants, and the rooms and baths literally strewed with flowers.

Enough has, I imagine, been said on the gardens of Persia to enable the reader to contrast the differences of style between the plan of "My Garden" with those of that country. He will also see how the Asiatic paradises closely resembled the parks and pleasure-grounds of England.

The Greeks, although they had an intimate knowledge of these Persian paradises, did not themselves have gardens on anything

the like scale. Probably many of the Greeks—if not most of them—had small gardens attached to their houses, in which were grown such vegetals as were used at that time for the consumption by the family. Yet of the early Greek gardens we have little or no knowledge. The one described by Homer in his Odyssey must have been a mere creation of this poet's imagination. It was considered to be of enormous extent, being made to stand on four acres of land. Homer describes it as being surmounted by a hedge. In the garden he places "tall flourishing trees," "pears and pomegranates, and apple-trees producing beautiful fruit, and sweet figs and flourishing olives;" vines also grew there. The fruit-trees bloomed and fruited throughout the year, having no period of rest. The beds were laid out in order to the farthest part of the grounds, and these also flourished throughout the year. Two fountains were also in this garden of Alcinoüs. Aristophanes, who lived four hundred years before our era, in his work the "Aves," speaks in one part of "sweet-smelling gardens;" this passage appears to be the only place where real flower-gardens of the Greeks are mentioned: perhaps this is owing to the limited variety of flowers that the Greeks had. Still a certain number were cultivated, such as roses, violets, narcissi, iris, and a few other sorts, for chaplets and other decorations. Plutarch tells us that roses and violets were grown beside leeks and onions, thus displaying more fully the beauties of the flowers. A rose plantation possessed by a man is spoken of by Demosthenes, but this was probably kept for profit, and not for his own enjoyment.

At Athens, or rather at six stadia from that city, was situated the Academia, or public garden. It was laid out by Cimon, and in it grew plane and olive trees; statues and works of art were also interspersed throughout the grounds. Plato, a great lover of nature, taught in these grounds, as did later his followers, thence acquiring the name of the Academic philosophers. Epicurus had a garden near to the Academia, where he instilled his ideas into his followers. Other philosophers and writers had also gardens.

If the ancient Greeks have not handed down to posterity accounts

of brilliant flower-gardens, they inform us by their writings with what care were kept their sacred groves. In them grew various kinds of trees, even fruit-trees as well as ornamental and odoriferous plants. With this people trees and plants were intimately associated with their religion; and the gods were considered to be ever ready to avenge any injury inflicted on the trees or shrubs sacred to them. At Scillus, on the road from Lacedæmon to Olympia, Xenophon tells us, was the site of the temple of Diana; where there was "a grove of cultivated trees bearing whatever fruits were eatable in the different seasons." Pausanias writes of a grove attached to the temple of Diana where various fruit-trees were grown. The same author also describes a grove attached to the temple of Æsculapius at Athens as being "most beautifully planted with trees," and which "is no less delectable for the sweet smell which it exhales than for the pleasant spectacles which it affords." And Sophocles makes the grove of Colonos famous in the Chorus of the "Œdipus Coloneus," in which the following words are put into the mouth of Antigone:—"But this spot here is consecrated, as one may certainly conclude, all full with the bay, the olive, the vine, while within it dense flocks of winged nightingales are singing sweetly." Sacred groves were in other countries besides Greece. Pindar sings the praises of the one at Pisa. Strabo gives an account of the grove of Acanthus, which was situated above Memphis at the base of the low Libyan hills. Then there was another between the Nile and Abydos, which was sacred to Apollo. Pliny the Elder speaks of a grove consecrated by the people of Latium to Diana, which was situated on a hill called Corne, near to Tusculum. This grove, he says, existed from time immemorial, and consisted of beeches, the foliage of which had the appearance of being trimmed by art. And many other groves there were, among which the Druidical ones hold a conspicuous place.

Let us now, however, see what knowledge the Romans had of horticulture, and what the distinctive feature of their gardens was. In a letter of Pliny the Younger is such a full and admirable description of his villa and garden at Tusculum, which was under one of

the Apennines, that I cannot do better than transcribe his own words so far as they relate to the grounds, as this is a type of what the better class of the gardens of this nation were at that period. The house itself stood on a rise of ground and commanded a fine view of the surrounding country, and it faced the south. Before a portico which was in front of the house "is," says Pliny, "a sort of terrace, embellished with curious figures, and bounded with a box hedge, from whence you descend by an easy slope, adorned with the representation of divers animals in box, answering alternately to each other, into a lawn overspread with the soft—I had almost said the liquid—acanthus; this is surrounded by a walk enclosed with tonsile evergreens, shaped into a variety of forms. Beyond it is the *gestatio*, laid out in the form of a circus, ornamented in the middle with box cut in numberless figures, together with a plantation of shrubs, prevented by the shears from shooting up too high; the whole is fenced in with a wall covered by box, rising by different ranges to the top. On the outside of the wall lies a meadow that owes as many beauties to nature as all I have been describing within does to art; at the end of which are several other meadows and fields, interspersed with thickets." The hippodrome, which was here merely a walk, was encompassed on every side by plane-trees covered with ivy, "so that while their heads flourish with their own foliage, their bodies enjoy a borrowed verdure; and thus the ivy, twining round the trunk and branches, spreads from tree to tree, and connects them together. Between each plane-tree are planted box-trees, and behind these, bay-trees, which blend their shade with that of the planes. This plantation, forming a straight boundary on both sides of the hippodrome, bends at the farther end into a semicircle, which, being set round and sheltered with cypress-trees, varies the prospect, and casts a deeper gloom; while the inward circular walks (for there are several), enjoying an open exposure, are perfumed with roses, and correct by a very pleasing contrast the coolness of the shade with the warmth of the sun. Having passed through these several winding alleys, you enter a straight walk which breaks out into a variety of

others, divided by box hedges. In one place you have a little meadow; in another the box is cut into a thousand different forms,—sometimes into letters expressing the name of the master, sometimes that of the artificer; whilst here and there little obelisks rise intermixed alternately with fruit-trees; when, on a sudden, in the midst of this elegant regularity, you are surprised with an imitation of the negligent beauties of rural nature, in the centre of which lies a spot surrounded with a knot of dwarf plane-trees. Beyond there is a walk planted with the smooth and twining acanthus, where the trees are also cut into a variety of names and shapes. At the upper end is an alcove of white marble, shaded with vines, supported by four small Carystian pillars. From this bench the water gushing through several little pipes, as if it were pressed out by the weight of the persons who reposed themselves upon it, falls into a stone cistern underneath, from whence it is received into a fine polished marble basin, so artfully contrived that it is always full without ever overflowing. Corresponding to this is a fountain which is incessantly emptying and filling, for the water which it throws up to a great height, falling back into it, is by means of two openings returned as fast as it is received. Fronting the alcove (and which reflects as great an ornament to it as it borrows from it) stands a summer-house of exquisite marble, the doors whereof project and open into a green enclosure; as from its upper and lower windows the eye is presented with a variety of different verdures." Adjoining this summer-house was a little room in which Pliny was wont to lie on a couch and fancy himself in a wood. In this place was also another fountain, and "in different quarters are disposed several marble seats, which," continued Pliny, "serve, no less than the summer-house, as so many reliefs after one is wearied with walking. Near each seat is a little fountain; and throughout the whole hippodrome, several small rills run murmuring along, wheresoever the hand of art thought proper to conduct them, watering here and there different spots of verdure, and in their progress refreshing the whole."

From this account we find that the Roman gardens at that time

were essentially formal ones, and that they consisted of a sort of terrace placed before the portico of the house, termed the *xystus*, which was divided into flower-beds of various shapes bordered with box; and that rows of tall trees, generally the plane, were planted, and there were alleys or walks enclosed by hedges trimmed into fanciful forms—a *gestatio*, or avenue in which the Romans were wont to be carried to and fro in a litter, and thus enjoy the air without fatigue beneath the shade of trees; and a *hippodromus* or circus, which was generally—though not always, as in this case—used for horse exercise, in which were several paths divided by box hedges and shaded by large trees. Besides this, the Roman gardens frequently had other flower-beds in other parts of the garden; sometimes these were raised on terraces, on whose slopes were planted evergreens or creepers. Then there was always a vineyard, an orchard, and a kitchen-garden. And the villas had also generally attached to them enclosures for preserving dormice and snails—for which the Romans had a great partiality; and fish-ponds—some supplied with salt water, which was not unfrequently brought from a considerable distance; and aviaries and poultry-yards were also not excepted.

The barbarous custom of clipping and twisting trees and shrubs into grotesque forms was much in vogue among the Romans, by whom this "*ars topiaria*," as it was termed, was much admired; the gardeners even acquiring from it the name of "*topiarius*." This ugly fashion is said to have been introduced by C. Matius, a friend of the Emperor Augustus. The covering of the stems of trees and of stumps with ivy was also extensively practised among the Romans.

The gardens adjoining the golden palace of Nero were very differently laid out to the formal one of Pliny. That monarch, who was a great admirer of Eastern manners and customs, caused his grounds to be laid out somewhat like the "paradises" of the Persians. In them, says Tacitus, were lawns and lakes, groves and open spaces and prospects combined.

It would be too tedious to enumerate the divers gardens of the Romans, for many of the more wealthy citizens had numerous villas,

some with large grounds attached to them, whilst the dwelling-houses of others were such magnificent buildings, that they sometimes covered more space than the grounds themselves, and whose owners—as Lucullus—fell thereby under the chastisement of the censors for having, as Pliny says, "more ground to sweep than to plough."

Besides the villa at Tusculum, Pliny had another situated at Laurentinum, which was but a short distance from Rome, and was on the sea-shore. To this a small garden was attached, consisting of the *xystus*, "perfumed with violets," the kitchen garden, a *gestatio*, a vineyard, and fish-ponds. Pliny had, beside these, several other villas, two of which were situated on the Lake Como, one being called his tragic and the other his comic villa.

From the Elder Pliny we learn that pleasure-grounds, as well as extensive fields and villas, existed in the city of Rome: and Cæsar, Pompey, Lucullus, and Sallust had gardens there. The one of Sallust was on the Quirinal Hill, and was very extensive. Those belonging to the Emperors Caracalla and Geta were of still greater extent, comprising amongst others those of Sallust, Lucullus, Agrippa, and Domitian. Besides Rome, many other towns under the Roman occupancy had large grounds attached to the houses of the wealthy citizens; among the more noted was Baiæ, which is on the Bay of Naples, and which was the favourite place of resort for the Romans. At Pompeii the houses had a kind of court called the *peristylium*, which was surrounded by pillars. On the walls were paintings representing trees and birds, and other objects appertaining to a real garden. In the middle of this court—which was open in the centre—plants and shrubs were usually planted. Not unfrequently—as in the case of the house of Meleager—it possessed also a beautiful fountain. Besides these miniature gardens, some of the larger houses of Pompeii had attached to them small cultivated plots of ground. The house of Pansa had a garden of about 100 feet long, and the one attached to the villa of Diomedes was 111½ feet square, in the centre of which was a fountain, and a colonnade surrounded the whole.

But at a still earlier period of the Roman history, gardens existed at Rome. We read in Pliny that the kings used to amuse themselves by working with their own hands in them, as did the Persian monarchs; and the same authority also informs us that before most of the houses of the poorer citizens of Rome were little gardens, but this pleasure was in later times denied to them by the necessity of shutting out the robbers that infested the city. These were simply little kitchen gardens, or *horti*, wherein were grown the vegetals for the consumption of the family; the keeping of them in proper order was considered to be the province of the wife, and this, if neglected, drew upon her the appellation of being "a bad and careless manager of her family," as she would thereby be obliged "to have recourse to the shambles or herb-market."

Conservatories and hothouses do not seem to have been known before the Christian era, and for their construction thin plates of talc were formerly used instead of glass. By this means the Emperor Tiberius had cucumbers throughout the year, and roses—a very favourite flower of the Romans—were also forced. This people appear to have been very fond of flowers, which they frequently kept in pots in their windows. Yet the number of varieties of plants with which they were conversant appears to be very limited. Of all trees, the plane was the special favourite: they were generally planted in rows. Sometimes they carried their admiration for this kind of tree to such a ridiculous extent that we read of wine being occasionally supplied to them instead of water. But this inordinate love for the plane was not confined to the Romans, for Herodotus writes that in Lydia Xerxes "found a plane-tree so very beautiful, that he adorned it with chains of gold, and assigned the guard of it to one of the Immortal Band."

Many fruit-trees were introduced into Italy by the Romans, among which were cherries, pomegranates, figs, almonds, citrons, peaches, and apricots. In the time of Pliny the Elder a physician of the name of Antoninus Castor, who lived to be an hundred years old, kept a kind of botanical or physic garden. Pliny visited this garden, and asserts that

in it were kept a vast number of plants, which Antoninus Castor himself tended.

At the fall of the Roman Empire the art of gardening succumbed also to the violence of the age; but it was, however, revived at a later period by the monks, and still later a great stimulus was given to the growth of plants by the Medici family, to whom many of the beautiful gardens of Italy owe their origin. Those which belong to the purely Italian style are architectural and geometric. These consist of terraces adorned with sculptures, and alleys of trees, and fountains and cascades, and rich parterres of flower-beds filled with exquisite flowers. Though the Italian gardens may be termed strictly formal, yet the house and the grounds—designed as they frequently are by the same architect—present such an harmonious whole, that instead of feeling the *ennui* and disgust so commonly experienced in formal gardens, the eye is enchanted with all it takes in; for in them is no stiffness, only so much of symmetry as accords with the genius of this classic land. Sometimes a wall surrounds the garden, though frequently extensive views are obtained from the terrace walks.

About the middle of the eighteenth century the English style of gardening was introduced into Italy. Though many grounds have been laid out in that manner, yet it has by no means superseded that of the pure Italian, which is so well adapted to be placed before buildings, of which we have numerous examples in our own country. Near to Florence, in a lovely valley among the Apennines, is Pratolino, formerly a residence of the Grand Duke of Tuscany, and this is a good specimen of an imitation of the park-like grounds which are often to be met with in England. But except in certain spots amongst the mountains—as in the instance just mentioned—lawns, which the English so pride themselves on possessing, or even grassy patches, are not to be found in ordinary Italian pleasure-grounds, the climate being too hot for their cultivation. The owner of a villa in the north of Italy having much admired the lawns he had seen in this country, took especial pains to have one in his own grounds. But though he took all the precautions of

regularly watering the one he had made, and of protecting it from the burning rays of the sun by a cloth stretched over the whole of it, yet in the autumn, when I saw it, it presented a very brown instead of a fresh green appearance.

Flowers are very highly prized in Italy, and many are the gardens that are especially kept for the growth of them for sale. The most astonishing of these are, to a native of a northern clime, the camellia gardens. In them I have seen, at Florence, large trees many feet high growing in the open air and laden with a profusion of blossom. There are also numberless gardens, some in the north but more in the south of Italy, wherein oranges and citrons are grown.

Fain would I yield to the temptation of minutely describing all the beautiful villas and gardens that abound in that glorious clime, but from want of space my remarks must be confined to a few only,—commencing with Florence, as there, perhaps more than in any other part, are situated those of the most repute. There, adjoining the Pitti Palace, is the Boboli garden that was planned in the sixteenth century, in the time of Cosimo I. It is in the Italian style, and has terraces which extend up the slope of a hill which rises immediately at the back of the palace. In other parts of the garden are interspersed basins of water, vases, and arbours, and very fine sculpture—the productions of Michael Angelo, Tacca, Giovanni, Bologna, and of other eminent men. The Boboli is said to have been a favourite place of resort of Michael Angelo, who was wont to come hither to enjoy the beauty of the scene, and ponder on the great works he contemplated in achieving. To the Cascine—the Hyde Park of Florence—a passing word must be given, as it is beautifully situated beside the Arno; here, amongst parterres of flowers and long alleys of trees, may be daily seen the cream of Florentine society.

The celebrated meetings of the Platonic academy instituted by Lorenzo the Magnificent were held at the beautiful villa Careggi. It was much frequented by the greatest of the Medici family, and

it was there that he died. The grounds are laid out in terraces, in brilliant parterres of flowers, and vases are interspersed in every part. Lorenzo de Medici here grew exotic plants which he procured from the East. From this garden is obtained a splendid view of the city, of the olive-trees, and of the Apennines beyond. Another of the favourite residences of Lorenzo de Medici—who contributed to a great extent to the rise of the art of gardening and of horticulture throughout Italy—was situated also at a short distance from Florence. At this "Villa Mozzi" is still shown the terrace where that wonderful patron of learning delighted to walk and admire the glorious view which it presents. At no great distance from these is the villa of Palmieri, celebrated by the poet Boccaccio as the scene of the curious story of a certain number of ladies having, during the plague of 1348, here resorted and given themselves up to every kind of pleasure, thereby endeavouring to drive the thought of death from their minds. A high-flown description of this garden is given in "Rienzi" in the chapter entitled "The Flowers amidst the Tombs." I will mention one more garden at Florence which belonged to Prince Demidoff, and which is attached to the most magnificent of villas. This garden is of considerable extent, and is kept up in a truly regal style. A very large number of hothouses and conservatories, and a splendid collection of plants, especially of orchids, are here grown. In one of the conservatories I saw a very pretty mode, which is quite worthy of being copied, of arranging cut flowers. These were placed in a saucer of water sunk deeply into rock-work. They were then covered with a pan of water having a flat plate-glass bottom, so that the flowers were seen through the water and the glass, and appeared to be growing at the bottom of the water.

At Rome are also many beautiful villas and gardens. The Quirinal Palace gardens are extensive, and when I had the pleasure of seeing them they were well kept up. In them is a curious hydraulic apparatus for playing an organ. This is not only to be seen in that garden, for at Trascati, Belvidere, belonging to Prince Borghese, water is employed for many curious devices, such as making the warbling of

birds,—making two organs to play,—starting up from invisible holes and squirting persons in the face,—and dashing down terraces, besides performing numerous other tricks. To these hydraulics the Italians are very partial; from them other nations have learnt these ingenious water tricks. They have been imitated by the Dutch: there are also, as well as in other parts, very amusing examples in a garden at Salzburg in the Tyrol.

The grounds adjoining the Villa Borghese are very much frequented by the Romans, and certainly they had a lovely appearance when I saw them one spring, when the park or uncultivated part was a rich parterre of the exquisite purple anemone, which there springs up without the aid of man. Other choice grounds at Rome, such as the Villa Doria and the Pincio, might be cited as being pre-eminent for their loveliness.

Neither is Naples behindhand in her gardens. Near the one belonging to Monsieur Dumontet is another, situated on the shores of the Bay, in which, as in that belonging to Prince Demidoff, are grown a large collection of plants. There are many other very beautiful ones.

Besides the gardens attached to villas, there are several botanica ones; and the Italians can boast of being the first people in Europe to establish purely scientific gardens. If we except the one of Antoninus Castor, which can hardly claim for itself the appellation of being a botanic garden, then the first in Europe was formed by a Tuscan noble at Padua in the sixteenth century, and a few years later another was established at Pisa under the auspices of the Medicis. Since that time botanical gardens have extended throughout Italy. Those I have seen at Venice and at Naples contain some highly interesting specimens of trees and plants.

I cannot leave the gardens of Italy without saying one or two words on a very pretty garden which a countryman of ours—Dr. Bennett—has made at Mentone, and which, to use his own words, "is hanging as it were on the flank of the mountain," and faces the lovely bay. A long, straight terrace entrance walk leads from the gate; on each side of this, at regular intervals, are pillars of stone, to which are attached creepers, to twine and form a canopy overhead. On a marble

slab beside the gate are inscribed some words of welcome, inviting you to enter. This garden is tastefully arranged, and commands a splendid view of the Mediterranean, as well as of the surrounding mountains. In it the owner amuses himself during the winter and spring months in acclimatizing various plants hitherto unknown in that locality.

And now I must speak of the characteristic features of the gardens of another nation, which at one time were considered to be models of perfection of taste, and hence were copied by other nations, especially by England, in the beginning of the eighteenth century. I allude to the Dutch gardens. These, though geometrically laid out, are very different from those in Italy or in France. Yet some have considered that Holland did but endeavour to imitate to some extent the formal French gardens which were in vogue some hundreds of years back. The chief peculiarities of a Dutch garden may be said to consist in its being seen at one glance;—in the utmost symmetry being observed in all its parts, betraying by its stiffness and artificiality the whimsical devices of man rather than the beautiful luxuriance of nature;—in its trees being clipped sometimes into curious shapes and figures, as was practised by the Romans of old whose gardens may be compared to these;—in its having long serpentine or straight walks, generally ending in a studied vista view, sometimes crossing each other at right angles, the centre of the point of intersection being then formed into a parterre geometrically formed and filled with gaudy flowers quite irrespective of arrangement of colour;—in the *berceau* of lime-trees trimmed into shape and having at certain distances openings or windows made in the foliage;—in the grassy banks and mounds, which are all formed and kept in the most prim and artificial manner;—and lastly, in its containing canals or ditches,—filled with water that is frequently stagnant,—which intersect most, if not every garden. The Dutch have a special predilection for water, and employ it to a great extent either for ornamentation as fountains, as moats surrounding their grounds, or as canals intersecting them; and not unfrequently in their gardens are found some curious examples of conceits in hydraulics which they have learnt from the Italians. But

this ornamentation of water and grassy mounds has—in the wet, humid, and flat country of Holland—a very unpleasing effect.

The best specimens of the Dutch style were the Royal Gardens at Loo, which were laid out in the seventeenth century by William and Mary, afterwards the sovereigns of this country. These were composed of four gardens—the lower and upper, the king's and the queen's—besides labyrinths. The one at Hague, which belonged in the seventeenth century to the Count de Nassau, which was a celebrated one, is now but badly kept up. Most of the Dutch gardens of the present day combine the English style with that of their own; yet there still exist in Holland many specimens of that style which may be truly termed the purely Dutch. Near Utrecht is a private garden, belonging to a merchant, which, though somewhat narrow, extends to a considerable distance. Tall and thick hedges of beech, hornbeam, and oak, cut into a variety of shapes, are employed for the larger divisions of the grounds, whilst the smaller are divided by hedges of yew and box. The ornaments in this garden consist of grottoes and fountains, statues and busts, urns and vases. There are, besides, the usual long *berceau* walk of beech, with its windows, and several avenues of walks terminating in vistas. Everything here—according to the Dutch system—has its counterpart, so that where there is a pond, walk, statue, or group of evergreens on the one side, there is the same to match it on the other. The two ponds that are surrounded with old chestnut-trees are similar, though much smaller, to the one in Bushey Park, and in the extremity of the grounds is a large circular walk shaded with beech-trees, in the centre of which is a piece of water. The usual adjuncts, as greenhouses and forcing-frames, also form a part of the garden.

The Dutch people of all classes are fond of cultivating plants. In the environs of Rotterdam there are a series of little gardens belonging to the tradesmen of the town. On the cultivation of them great care is bestowed, and in them are grown fruit-trees, generally kept dwarfish, and flowers. To each garden is attached a kind of garden, or summer-house—termed *tuin-huisjes* or *lust-hofs*—and thither the proprietors repair with their families on a Sunday afternoon, to enjoy the quietness

and repose by the contemplation of Nature's works. These remind us of those little gardens, with their summer-houses, which some of the tradespeople of the East of London possess at Lea Bridge.

If the Dutch cannot be said to have an innate taste in the laying out of grounds, great credit is due to them for their knowledge of the art of horticulture, more especially in that branch of it which appertains to the growth of bulbous flowers. These at an early period they procured from the East, and by great skill they have managed to bring them to a perfection unequalled by any other nation. Haarlem is the chief place for perfecting the different species of bulbs; and not only do the Dutch cultivate them as a means of livelihood, but from an exceedingly great love which they possess for these gaudy flowers. In the seventeenth century the passion of this nation for tulips was so great that it was known by the name of the tulipomania, and, as may readily be understood, all the evils likely to attend such a mania occurred. The French author Dumas has very ably shown this in a fictitious tale called the "Black Tulip."

France claims to be the school of the geometric system of gardens. Le Nôtre, the founder of this style, was a celebrated architect and designer of gardens, and had previously, in his youth, studied painting in the studio of Lebrun. His *chef-d'œuvre* were the gardens of Versailles, which were formed during the reign and under the auspices of Louis XIV. The boldness and the grandeur of Le Nôtre's designs prove him to have been gifted with a lofty genius. Truly Versailles—previous to the construction of the Crystal Palace Gardens, which were made a hundred years later—might have vied in its magnificence with the "Hanging Gardens" of Babylon. How different is it to the niggardly geometric Dutch gardens! Versailles, as most of my readers are doubtless aware, consists of immense terraces and parterres, and fountains of world-wide repute are placed in different parts of the grounds. Unfortunately, most of the trees near to the Palace are clipped into shape.

Gardens have ever been a passion among the French, and therefore, as may be supposed, abound in their country. So early as the eighth

century, Charlemagne encouraged the art of gardening, and introduced the best fruits into his kingdom; nevertheless that art does not appear to have attained to anything like perfection until the seventeenth century, when, as a brilliant comet, the genius of Le Nôtre suddenly burst forth. Ere this, however, Francis I. formed some pleasure-grounds at Fontainebleau, in imitation of those he had seen in Italy; these, from what we can gather, must have somewhat resembled the one of Pliny at Tusculum. The terrace, at a later period, was made by Le Nôtre, who also considerably altered the arrangements of the grounds; and still later, the part which is now known as the English garden was planned.

Shortly before the first Revolution, and towards the middle of the last century, the English style of gardening became very fashionable in France; so much so, indeed, that many of the old geometric gardens were even destroyed, and relaid out according to the new system. Marie Antoinette caused the pretty grounds of the Petit Trianon at Versailles to be so arranged.

No city perhaps possesses so many beautiful gardens, parks, and promenades as Paris. The beautiful grounds adjoining the Tuileries Palace were designed by Le Nôtre. Sculpture and basins of water with fountains, and a profusion of flowers, are here everywhere to be seen. Here too in the summer months are rows of orange-trees, perfuming the air with their flowers, reminding one of the redolence of the orange gardens of Italy. Immediately adjoining the Palace is the English garden, and this used to be kept railed off from the public part during the residence of the Imperial family in this city. A fine vista is obtained from the centre pavilion, along a broad straight walk lined on each side by tall trees. Beyond this garden is the Champs d'Elysée, in which, besides trees, are numerous parterres of flowers, amidst which are fountains. Beyond this again, and past the Arc de Triomphe, is the Bois de Boulogne, laid out by the Emperor Napoleon III., and which, for the exquisite taste shown in it, combining as it does the wildness of a wood and the high cultivation of a flower garden, deserves at least a word of the highest

praise; the more so as our Government, by imitating its more cultivated parts, have greatly improved the parks of London.

The Park of Monceau, which is in reality more a garden than a park, and the grounds of St. Cloud, are also very beautiful specimens of French gardens, and many others might likewise be enumerated as existing at Paris, which either owed their origin to, or were greatly improved by, the Emperor Napoleon III. Among the more ancient and celebrated ones, I will only mention those of La Malmaison, laid out in the English style by the Empress Josephine; of Marly, where it was once said that it never rained; and the Jardin des Plantes, so famous until the last unhappy war, not only as being the Zoological Gardens of Paris, but also—until then—for the large collection of orchids and other plants that were there grown.

Let us now turn to our own country, and see whether the same deep feeling for Nature is, as a people, imbued in us as it is in the French. In England the first rudiments of the knowledge of horticulture were introduced by the Romans: most of which—though the Saxons appear to have had herb-gardens—was lost amidst the anarchy that ensued after the departure of the former people from this isle. It was, however, resuscitated by the Normans. In Domesday Book, one "apple-garden" is entered as being situated at Nottingham, and the words *horti* and *hortuli* more than once occur in that book. The vine must have been brought to this country by the Romans: in the eighth century vineyards are spoken of by Bede, and later, William of Malmesbury names Gloucestershire as being the county where they were mostly cultivated. At Hatfield House a part of the garden is called the Vinery to this day. In the twelfth century, Alexander Necham, in his work "Naturis Rerum," gives names of various trees which he says ought to be grown in a "nobilis hortus:" but unfortunately many of these could not possibly have been acclimatized in this country at that time; so that much reliable information as to the real state of horticulture in England at this early period cannot be obtained from this work. According to him, a flower-garden should be stocked with roses, lilies, sunflowers, violets,

poppies, and narcissus. The rose was from a very early time a favourite flower of the English: in the ancient conveyances it was a common occurrence to render annually one for quit-rent. The lily too, we gather from other sources, was grown in 1276 in the Royal Garden at Westminster. About the same time many kinds of fruits were cultivated in this country, amongst which were cherries, mulberries, pears, apples, vines, quinces, medlars, gooseberries, strawberries, raspberries, peaches, and almonds, as well as culinary vegetals, such as cabbages, peas, beans, lettuces, rocket, mustard, and various kinds of herbs, watercresses, hops, onions, garlic, leeks, and probably beets.

Still, there is very little known of the plans of the early English gardens. Doubtless there was but little skill shown in them, though one authority informs us that in the twelfth century beautiful gardens were attached to the houses of the citizens of London, but in what their beauty consisted is by no means clear. Yet both Blenheim and Woodstock existed at the same period. From the early English illuminated MSS. large gardens are represented as being supplied with a pond or well, and sometimes also,—though rarely,—with even fountains and grottoes. In the "Romaunt of the Rose," Chaucer describes a garden, which was a perfect square, and which

> "Enclosed was, and walled wele,
> With hie walles embatailed,
> Portrayed without, and well entayled
> With many a riche portraiture."

Possibly much of the descriptive part of it, and of the trees and plants which are enumerated as growing in this imaginative garden, was founded on fact. There was another and a real garden, of the fourteenth century, in Holborn, belonging to the Earl of Lincoln, by whom it was kept up for profit as well as for recreation. From an account in the office of the Duchy of Lancaster the sum of £9 2*s*. 3*d*., equal at the present day to £135, was raised during the year for the sale of the surplus fruit. The only flowers that are mentioned are roses, and what were sold of these amounted to 3*s*. 2*d*. The fruit-trees in this garden consisted of apples, pears

large nuts, cherries, and vines, the cuttings of the latter being also sold. Beans, onions, garlic, leeks, and a few other vegetals, were also grown in this garden. It is mentioned that to replenish it cuttings of some varieties of pear were purchased. A paling or fosse enclosed the grounds, in which was a pond or vivary, containing some pike.

But there is very little to be said about the gardens of England until the reign of Henry VIII., when those at Nonesuch (whose site is only a few miles from "My Garden") and Hampton Court were made. Nonesuch, as its name implies, was considered to be the wonder of the age: on it no expense was spared. The grounds were laid out in a formal style, and they comprised kitchen and pleasure gardens, a wilderness, and small park. Dispersed in the pleasure gardens were columns and pyramids of marble and fountains. This place was, in the last century, relaid out in the modern style by Kent. The finest grounds that were formed in Queen Elizabeth's reign were at Hatfield and at Beddington, as has been already mentioned in the first chapter.

The same formal old English style of laying out gardens continued until Charles the Second's reign, notwithstanding that Lord Bacon strongly protested in the time of James I. against the clipping of trees, and "the making of knots or figures with divers coloured earths, that they may be under the windows of the house on that side on which the garden stands. They be," continues he, "but toys: you may see as good sights many times in tarts." Judging from some of the beds at the Horticultural Gardens and at Bethlehem Hospital, this great philosopher has not to the present day succeeded in eradicating this reprehensible custom.

On an invitation from Charles II., Le Nôtre came over to this country, and laid out the parks of Greenwich and of St. James's. He also planted the Mall with an avenue of trees, and from this time to the accession of William and Mary his style became general throughout the country, when it was superseded by that of the extremely uncommendable Dutch, and then not only did Hampton Court become con-

verted into an exact copy of a Dutch garden, but everywhere else this style was imitated. But in the following reign Wise and Loudon showed such skill in the planting of a gravel pit in Kensington Gardens, as to gain from Addison the highest praise.

The style that is essentially English, and which has been copied to a greater or less extent by every other European nation, has been attributed to the writings of Pope and Addison. Not only did they protest against the unseemly stiffness of the gardens which were then in vogue in England, but they both attempted in their country retreats —the one at Twickenham, the other at Bilton near Rugby—that natural picturesqueness which, from its partaking of the "beautiful wildness of nature," is compared by Addison to the Pindaric manner of composition; and to this class belongs "My Garden." With him, I can say that mine is "a confusion of kitchen and parterre, orchard and flower garden," that is "mixt and interwoven" together. As was his, so is "My Garden," "a natural wilderness," and "my flowers grow up in several parts of the garden in the greatest luxuriancy and profusion." With Pliny the Elder, I agree that gardens should have their due meed of honour, and that things because they are common are not for that reason to enjoy the less share of our consideration; so that, like Addison, "if I meet with any flower in a field which pleases me, I give it a place in my garden." By this means there are flowers which some of my friends have singled out as some of the greatest beauties of the place, and although they might have been transplanted from under a common hedge, from a field, from a wood, or from a mountain.

The first great designer—a man of truly poetic temperament—of this picturesque style of landscape gardening, was Kent. In designing the plans for laying out gardens he considered the genius of the place, and endeavoured to improve and not to distort Nature. By him, and by his successors, many of the old formal gardens were remodelled.

Though the writings of Pope and of Addison, and later of Thomson, caused such an immediate beneficial effect upon the designing of gardens, yet it has been by some doubted whether they were the

fountain-head whence our knowledge of this style was derived, for the first idea of it is by some attributed to Milton, by others to Tasso. Others, again, assert that it was in this manner that Nero caused his garden at Rome to be laid out, and which he is said to have imitated from the Persian paradises; whilst many suppose that the Chinese first gave us the idea to copy in our gardens the various beauties of natural scenery.

Certainly the Chinese are particularly skilful in producing various scenic effects in their gardens. One of their ancient writers, Lieutschen, says, "The art of laying out gardens consists in an endeavour to combine cheerfulness of aspect, luxuriance of growth, shade, solitude, and repose, in such a manner, that the senses may be deluded by an imitation of rural nature. Diversity, which is the main advantage of free landscape, must, therefore, be sought in a judicious choice of soil, an alternation of chains of hills and valleys, gorges, brooks, and lakes covered with aquatic plants. Symmetry is wearying, and *ennui* and disgust will soon be excited in a garden where every part betrays constraint and art." And this is a good description of the gardens of China, so that in the immediate vicinity of the main habitation the grounds are made to coincide with the formality of it, and are therefore geometrically laid out; the Chinese considering that in such a position wild scenery would be as unapt as a diamond set in lead; whereas rustic buildings are invariably placed amidst a wild and ruggedly-formed country. Besides this, the Chinese are adepts in magnifying the seeming dimensions of any piece of land which they lay out, making thereby their gardens appear even considerably larger than they are in reality: this is the case, for instance, in the Imperial garden in the vicinity of Pekin, which has been computed to be no less than twelve miles in circuit. These grounds are very beautifully arranged, and they quite deserve the name of Yuen-ming-yuen, or "the garden of perpetual brightness." Of considerable extent are also the Imperial grounds of Zhe-hol, or "the garden of innumerable trees." Here are lakes, miniature mountains, rocks, and choice cultivated spots, amongst which are interspersed numerous

buildings and pagodas, exhibiting the utmost diversity of scene, all formed by the skill of man, who has obtained this by imitating the beauties of Nature, instead of attempting to distort her. But this nation is very partial to gardens. In Pekin over some of the houses in the main streets are broad terraces covered with shrubs and flowers. We read too that in Nagasaki, in Japan, most of the better class of houses have gardens, but these, however small they may be, are said to be laid out in the landscape style with rocks, miniature mountains, and waterfalls. In the larger gardens in China are usually artificial lakes or rivers, and fountains and cascades; in some of them, too, are scenes of spring, of summer, and of winter, where are grown those plants that are suitable to the season, from which these spots have derived their name. Flowers are not scattered indiscriminately along the borders, but are tastefully disposed according to their colour and growth; and indeed the gardeners of this country show great skill, not only in the arrangement of the different parts of a garden, but also in the disposing of the plants and in the culture of the flowers. China is everywhere highly cultivated; even those parts which consist of bogs and marshes this ingenious people bring into cultivation, by forming on them rafts of bamboo, which they cover with earth, and on these they are then enabled to produce vegetables. These rafts of bamboo remind one of the so-called floating gardens of Mexico—formerly so numerous—and which were made by branches of willows, or of any other similarly light and buoyant material, being plaited and twisted together; this was covered by earth, or rather mud, obtained from the lake Clavigero, on which these gardens floated. They are said to have been made at the founding, or shortly afterwards, of the city of Mexico, and were formerly numerous, as well as very productive. Small huts were built on these rafts for the cultivators; and by means of a boat these curious islands were moved wheresoever the owner required.

Near Canton are the celebrated Fa-tee gardens, where on a New Year's day repair throngs of people to enjoy this holiday in the "flowery land." But I think sufficient has been said of the gardens

of the Chinese to demonstrate how nearly—more nearly than those of other nations, even more nearly than the one described by Addison—the plan of "My Garden" agrees with the peculiar character of those formed by this extraordinary people. I will therefore only mention one more garden of this nation, the one at Macao, where the great Portuguese poet Camoens studied nature, and reflected its charms so accurately, and so enthusiastically, in the beautiful poem of the "Lusiad."

In India rose-gardens are numerous. At Ghazeepoor, roses are cultivated in vast fields of many hundred acres in extent. There are also many other gardens, in which grow beautiful plants, to be found throughout that country—a country so distinguished for its adoration of Nature, as is testified by their sacred writings the "Vedas," as well as by their secular literature.

In Turkey, gardens also abound. Lady Mary Wortley Montague has depicted them in glowing terms; but from other sources they do not appear to come up to that lady's high-flown descriptions, although their shade, and their sweet-scented and bright flowers, interspersed among cascades and fountains, must make them very pleasant resorts.

In Spain, too, they are very numerous and very beautiful. At Madrid most of the wealthier classes have them, but in the south they are much more general. Seville and Cadiz especially are noted for the love its citizens have for flowers, and for the gardens which the majority of them possess: in those towns the balconies, windows, and even roofs of the houses are converted into parterres of flowers. On a rugged eminence at Grenada, which is surrounded by pleasure-grounds, is the Moorish Palace of the "Casa de l'Amar," the gardens of which were laid out by the Moors. They are arranged as terraces, ornamented with statues and fountains, and cascades and lakes. But probably the most ancient of the old Moorish gardens is "Alcazar," which is adorned with fountains, and has parterres of evergreens and choice flowers. The walks are paved with marble. Other celebrated gardens there are, among which may be named the Escurial at Madrid, the Aranguez, and La

Granja or San Ildefonso—the Versailles of Spain—which Philip V., who caused it to be laid out, is said to have exclaimed on beholding it: "It has cost me three millions, but for three minutes I have been amused!" And lastly, there are the gardens of the Alhambra, which were considered so very lovely, that a long inscription, placed at the entrance of the one called the Lindaraxa, thus ends: "Where is there a garden like unto this? Its verdure and its fragrance excel all others; and its freshness is diffused far around."

I cannot here refrain from saying a passing word of eulogium on the very beautiful garden of Mr. Cook (the Viscount de Montserrat) at Cintra in Portugal; for that gentleman has not only most beautifully laid out his grounds, but, regardless of expense, has succeeded in extending the knowledge of horticulture in that country by the acclimatization of new and rare shrubs and plants. In our own country, one of the Scilly Islands has been converted into a subtropical garden by the ability of Mr. Smith, formerly Member for one of the divisions of Cornwall. There grows, in the open air, the gum-tree, and, what is more particularly interesting, there is a geranium hedge twenty feet long, which in 1862 was said to be ten feet high, and whose bright pink flowers, when seen from the sea, present from a considerable distance a strange yet beautiful appearance.

Many more examples I might bring forward, to show how every nation has, in a greater or less degree, had gardens. Throughout Germany they are to be found, likewise in Russia, Denmark, Poland, Switzerland, and other countries. In the other hemisphere we find them, in North and South America: and here I must mention the Shakers' gardens in New Lebanon, at New York, for in them are grown the narcotic herbs for which they have a great reputation; as well as the garden at Rio Janeiro, which is kept up for the cultivation of the cochineal insect. None of the other gardens of the above-named countries offer, like those already described, any peculiar characteristics in the mode in which they are laid out, but comprise either one or a mixture of the styles of other countries; it is consequently needless for me to enter into fuller details of them.

For in this chapter I have endeavoured to show the various manners which different nations have had, of laying out gardens, according to the accounts which have been given to us, or to what I have myself observed in Europe.

We see that the love for gardening, or for nature, is not dependent either on a torrid, frigid, or temperate zone; but that in certain nations, as in certain individuals of a nation, it is more innate than in others; and we further see, that the art of gardening, whilst advancing in some nations, declines in others. But those persons who have ever enjoyed the calm repose of a garden, have watched the growth and habits of the various plants, delighted in the sweet music of the birds which dwell therein, will feel that "we are instinctively led, amid the everlasting change in nature, to feel the harmony of the wondrous powers pervading all things. He who contemplates them with the eye of the soul, feels the littleness of man amid the greatness of the universe."

Vign. XXX.—Mill on the Wandle.

Vign. XXXI.—Scene on the Wandle.

CALENDAR FOR THE YEAR 1871.

THE year 1870 closed on a Saturday amidst snow and frost.

My garden was covered deeply with snow, and scarce a trace of vegetation was discernible. The Drumhead Cabbages were covered over the top, showing a little green on one side. The Brussels Sprouts and Sprouting Broccoli were only partially concealed; but everything else was perfectly covered, and nothing but a uniform surface of snow could be discerned.

It was very interesting to see the dark colour of the pure water running down the central streamlet, with the white snow extending to the very edge of the water.

The Orchard-house was coated with a thick deposit of snow, and all my frames were very properly covered with straw and bast mats, over which was a thick layer of snow. The houses warmed, as the Cucumber-house and Fern-house, had no snow, but icicles from a few inches to two or three feet depended from the front lights. All the doors had ice at their margins, so that it was difficult to open them. The cats had found out the warmth of the glass, and delighted to sit upon it.

It was pitiable to see the poor birds, half stupid with cold and starvation. The dear little robins attended closely upon the gardeners. The starlings were so tame as to allow persons to approach quite close, and the gardener picked up one and placed it in the Fernery, where it forthwith began to look for insects and worms. It did not, however, long survive.

Our vinery was well supplied with grapes. Lady Downe's and West's St. Peter's were scarcely in perfection. Ingram's Prolific Muscat and Snow's Muscat Hamburgh were excellent; the Black Hamburgh and Buckland's Sweetwater were rather past; but White Tokay, Canon Hall, Muscat of Alexandria, and Bowood Muscat were perfectly good and hanging upon the trees.

In my Cucumber-house the cucumbers were in flower, but none were ready for the knife—probably in consequence of the dulness of the weather. In this house the Dove orchid (*Peristeria alata*) was in flower, and one Epidendrum. The beautiful Butterfly orchid (*Oncidium Papilio*) was nearly in flower.

In the Poor Man's House every plant looked in high perfection. An Azalea was in flower; the pretty yellow Coronella was in full bloom, so were several Cyclamens, Geraniums, and a few Camellias; one of the Nasturtiums (Fire-ball) was in flower, the yellow *Linum Trigynum* and *Acacia armata* were in bloom, which really looked lovely, contrasting as they did with the white snow outside.

The Fernery was in all its glory. To pass the threshold was to pass from the wintry blast to spring. Overhead were a Jasmine and two species of Passion-flowers, the *Passiflora Kermesina* and *Passiflora princeps*. Amongst other plants, a scarlet Eschynanthus and the scarlet *Epiphyllum truncatum* adorned the house, whilst two species of Cypripediums and two species of Calanthe were in the greatest perfection. The rare *Anæctochylus Lowii* was on the verge of flowering.

The Fernery was all that could be desired; but, alas! the cat had got in and devoured my pet gold-fish.

In the Cutting-house fine Rhubarb was to be found, and the Sea-kale was growing in the sea-kale pots, well covered with heating materials.

The Apple-house was well stored with many varieties of fine and excellent apples, but there were scarcely any pears, and those of no account.

Out of doors there was but one flower in blossom, namely, the

yellow *Jasminum nudiflorum* growing over the summer-house; and since it flowers under such trying circumstances, who would not possess a plant of the *Jasminum nudiflorum?*

Within the few days preceding the glass had dropped at night to 8° Fahrenheit, or twenty-four degrees of frost.

I propose to give the principal occurrences in every week of the year, which will serve as a guide to others having gardens in the same relative position as my garden is placed.

The result must, however, only be received as a general indication, as every year, from speciality of season, must necessarily differ.

"Then came old January, wrapped well
In many weeds to keep the cold away."—SPENSER.

JANUARY 1—7.—FIRST WEEK.

Mean temperature at Greenwich, 31°.1, being 5°.4 below the average: highest in shade, 45°.9; lowest in shade, 19°.21.—My Garden: highest in shade, 50°; lowest in shade, 9°. Black bulb: highest in sunshine, not observed; lowest on grass, not observed. Rainfall at Greenwich, 0.07 inch.

The frost which ushered in the year gave way on Thursday the 4th, and by Saturday morning a complete transformation scene had been enacted, as the face of the country was converted from a white alpine snow scene to the ordinary winter verdure.

FLOWERS: *Glass.*—Oncidium papilio. Odontoglossum pulchellum. Dendrobium moniliforme.

Out of doors.—Christmas rose. Violet. Jasminum nudiflorum.

FRUIT: *Glass.*—Grapes. Black Hamburgh; Muscat of Alexandria.

Out of doors.—Apples: Cox's Orange Pippin; Ribston; Braddick's Nonpareil; Golden Drop; Speckled Golden Reinette; Pearson's Plate.

VEGETALS: *Glass.*—Fine cauliflowers from cold frames. Sea-kale. Rhubarb.

Out of doors.—Collards. Savoys. Brussels sprouts. Carrots. Parsnips. Onions. Beet-root. Jerusalem artichokes. Horse-radish. Endive. Celery. Mustard.

GARDEN OPERATIONS.—On the 6th, frames which had been thickly matted for two weeks were opened.

NATURAL HISTORY.—A Smew or Smee diving duck shot. Pigeons, Ducks, Teal, Fieldfares, Starlings congregated, and were noticed migrating. Wren sang. Many birds perished, and were found dead in the garden, and in other places numbers were killed by cold and starvation.

JANUARY 8—14.—SECOND WEEK.

Mean temperature at Greenwich, 33°, being 3° below the average : highest in shade, 44°.8 ; lowest in shade, 18°.3.—My Garden : highest in shade, 50° ; lowest in shade, 14°. Black bulb : highest in sunshine, 78° ; lowest on grass,[1] 12°. Weather, cold and dull. Rainfall at Greenwich, 0.08 inch.

The weather during the week was cold and dull ; on the 11th an inch of snow fell in half an hour. A sudden rain occurred on the 13th, and on the 14th the sun was bright and cheerful. On examining my outdoor exotic ferneries it was pitiable to observe the destruction which had occurred, as all fronds, except those of the North American species, were frosted. My beautiful plants of Lomaria chilensis, of which I was very fond, my various Pterides, which had lived with me for many years, and my various species of Adiantums, were cut to the ground. My alpine plants did not seem to have suffered much. The strawberry plants had evidently suffered severely.

To our annoyance, the frost had frozen the water which had insinuated itself between the panes of glass, and by its expansion had broken many panes.

FRUIT : *Glass.*—Black Hamburgh practically useless. Muscats.

Out of doors.—Apples : Blenheim Orange ; Pearson's Plate ; Golden Drop ; Prince Albert ; Reinette du Canada ; Lord Derby ; Wellington ; Calville Blanche.

VEGETALS : *Glass.*—Mustard. Rhubarb. Sea-kale. Endive.

Out of doors.—Celery. Celeraic (which was less frosted than the celery). Jerusalem artichokes. Carrots. Parsnips. Turnips. Savoys. Collards. Beet-roots, but no watercresses, which was a loss.

GARDEN OPERATIONS.—In the houses geranium cuttings made. Cucumber plants struck from cuttings planted out. The trees in the Orchard-house were pruned, and the plants in the Poor Man's house and Fern-house sponged. Potatoes planted in boxes to start very gradually, and at the end of the week trees were planted out of doors, for the weather was too unfavourable before.

NATURAL HISTORY.—The trout were looking about for spawning-beds. Bullfinches congregated. Tomtits found dead.

JANUARY 15—21.—THIRD WEEK.

Mean temperature at Greenwich, 37°.1, being 0°.3 above the average : highest in the shade, 46°.7 ; lowest in the shade, 30°.7.—My Garden : highest in shade, 50° ; lowest in shade, 29°. Black bulb : highest in sunshine, 80° ; lowest on grass, 27° Rainfall at Greenwich, 1.32 inches.

FLOWERS : *Glass.*—Lilac.

Out of doors.—One snowdrop appeared.

FRUIT : *Glass.*—Grapes : Black Hamburgh (but past and spoiled) ; Muscat.

Out of doors.—Apples : Blenheim Orange ; Golden Drop ; Prince Albert ; Pearson's Plate ; Boston Russet ; Ribston Pippin ; Wellington ; Calville Blanche. Pears : Bellissime d'Hiver.

[1] The thermometer used for the lowest temperature is one with a naked bulb with a graduated glass stem covering the tube. (See for this and the black bulb thermometers, fig. 77.)

VEGETALS : *Glass.*—Sea-kale. Rhubarb. Endive. Mustard.
Out of doors.—Jerusalem artichokes. Beet. Carrots. Parsnips. Onions. Turnips. Cabbage. Savoys. Collards. Brussels sprouts. Celery.
GARDEN OPERATIONS : *Glass.*—Orchard-house trees pruned and tied. Cabbage, cauliflower, Brussels sprouts, red cabbage, and radish seeds sown in the Orchard-house.
Out of doors.—Apple and plum trees pruned. Currant and gooseberry trees pruned. Gooseberry trees manured. Hedges clipped. Grass and walks rolled.
NATURAL HISTORY.—Wild geese passed over. Trout visited spawn-beds.

JANUARY 22—28.—FOURTH WEEK.

Mean temperature at Greenwich, 32°.4, being 5°.6 below the average ; highest in shade, 46° ; lowest in shade, 25°.—My Garden : highest in shade, 46° ; lowest in shade, 23°. Black bulb: highest in sunshine, 87° ; lowest on grass, 18°. Weather, frosty. Rainfall at Greenwich, 0.54 inch.

The late continued frost had manifestly severely injured the Pampas grass. The stems of the tea roses appeared to have been injured. All the broccoli were killed.

FLOWERS : *Glass.*—Passiflora Kermesina. P. princeps. Poor Man's house looked charming, with its lilac, camellias, azaleas, &c.
Out of doors.—Ground covered with snow.
FRUIT : *Glass.*—Grapes : West's St. Peter's ; Muscat.
Out of doors.—Apples : Blenheim Orange ; Golden Drop ; Pearson's Plate ; Boston Russet ; Ribston Pippin ; Wellington.
VEGETALS : *Glass.*—Rhubarb. Sea-kale. Endive.
Out of doors.—Jerusalem artichokes. Carrots. Parsnips. Turnips. Beet. Onions. Leeks. Collards. Savoys. Brussels sprouts. Celery. Watercresses.
GARDEN OPERATIONS : *Glass.*—400 geranium cuttings planted in the first week were potted. Ferns potted. Cabbage seed sown in Orchard-house.
Out of doors.—Apple and pear trees pruned.
NATURAL HISTORY.—All the cats died. They appeared to have been poisoned, but the source was not traced. The birds were very tame, and six titmice, of three or four species, as well as some robins, were caught in a wire rat-trap baited with cooked meat, and were then turned loose into the fernery. The trout frequented the situations for spawn-bed, but did not spawn.

"And lastly came cold February,
Drawn of two fishes, for the season fitting,
Which through the flood before did softly slide
And swim away."—SPENSER.

JANUARY 29—FEBRUARY 4.—FIFTH WEEK.

Mean temperature at Greenwich, 32°.4, being 5°.6 below the average : highest in shade, 46° ; lowest in shade, 24°.—My Garden : highest in shade, 49° ; lowest in shade, 24°. Black bulb : highest in sunshine, 81° ; lowest on grass, 21°. Weather, dark and dull. Rainfall at Greenwich, 0.72 inch.

During the week the weather has been dark and dull, with some rain; frost lasted till Wednesday the 1st.

FLOWERS: *Glass.*—Cælogyne cristata came into blossom with nine spikes of flower, and formed a most beautiful plant. The Epiphyllum truncatum was in flower a second time this winter.

Out of doors.—The snowdrops during the week have abundantly appeared, but besides that the only plants in flower were the Christmas rose and the Jasminium nudiflorum.

FRUIT: *Glass.*—Grapes: West's St. Peter's and Muscat.

Out of doors.—Apples: Ribston Pippin; Blenheim Orange; Pearson's Plate; Prince Albert; Golden Drop; Wellington. Pears: Bellissime d'Hiver, for stewing.

VEGETALS: *Glass.*—Sea-kale. Rhubarb. Mustard. Endive.

Out of doors.—Carrots. Parsnips. Beet. Jerusalem artichokes. Horse-radish. Onions. Collards. Savoys. Leek. Celeraic. Celery. Watercress.

GARDEN OPERATIONS: *Glass.*—Orchids potted and cleaned. Verbena cuttings planted. Frame made up for potatoes.

Out of doors.—Seeds sown. Peas: Carter's First Crop. Daniel O'Rourke, and Champion of England. French Horn carrots. Olive-shaped radish. Ground dug for potatoes and trenched for onions. Potato onions and shallots planted. A new watercress bed made.

NATURAL HISTORY.—On Saturday, small flies out of doors. A perfect chorus of robins and thrushes. The tomtits placed in the fernery had in a single week effectually cleared every green fly and scale from the Fern-house. Lamperns arrived in the Central brook.

FEBRUARY 5—11.—SIXTH WEEK.

Mean temperature at Greenwich, 41°.6, being 2°.9 above the average: highest in shade, 52°.2; lowest in shade, 25°.—My Garden: highest in shade, 54°; lowest in shade, 26°. Black bulb: highest in sunshine, 103°; lowest on grass, 28°. Weather, showery. Rainfall at Greenwich, 0.72 inch.

A great fall took place in the barometer, accompanied by wet on Friday and frost on Saturday.

FLOWERS: *Glass.*—Phajus grandiflorus. Czar violet.

Out of doors.—Female flower of nut. Crocus.

FRUIT: *Glass.*—Grapes: Muscat; Lady Downe's; West's St. Peter's.

Out of doors.—Apples: Reinette du Canada; Blenheim Orange; Pearson's Plate; Golden Drop; Old Nonpareil; Braddick's Nonpareil; Calville Blanche.

VEGETALS: *Glass.*—Rhubarb. Sea-kale. Endive. Mustard.

Out of doors.—Carrots. Parsnips. Onions. Leeks. Collards. Savoys. Brussels sprouts. Jerusalem artichokes. Celeraic. Celery.

GARDEN OPERATIONS: *Glass.*—Potted British ferns repotted. Orchard trees pruned.

Out of doors.—Early potatoes planted. Broad beans sown. New plantations of rhubarb made. New plantations of alpine strawberries made. Apple-trees, gooseberry and currant bushes, and raspberry canes pruned.

NATURAL HISTORY.—Two tufted ducks shot.

FEBRUARY 12—18.—SEVENTH WEEK.

Mean temperature at Greenwich, 42°.7, being 4°.5 above the average; highest in shade, 54°.7; lowest in shade, 26°.5.—My Garden: highest in shade, 51°.5; lowest in shade, 27°.5. Black bulb: highest in sunshine, 93°.5; lowest on grass, 29°.5. Weather, fine and mild.

FLOWERS: *Glass.*—Cymbidium sinense. Abutilon vexillarium.

Out of doors.—Scilla siberica. Hepatica, red and blue. Allspice. Ranunculus ficaria.

FRUIT: *Glass.*—Grapes: Muscat; Lady Downe's Seedling; West's St. Peter's.

Out of doors.—Apples: Reinette du Canada; Braddick's Nonpareil; Golden Drop; Old Nonpareil; Wellington; Calville Blanche.

VEGETALS: *Glass.*—Sea-kale. Rhubarb. Mustard.

Out of doors.—Jerusalem artichokes. Parsnips. Beet. Savoys. Collards. Curled kale. Brussels sprouts. Onions. Horse-radish. Watercresses. Celery. Celeraic.

GARDEN OPERATIONS: *Glass.*—Potatoes planted in frames. Carrot-seed sown in frame. Lilium lancifolium and auratum potted.

Out of doors.—New plantation of Jerusalem artichokes made. August-sown onions planted out. *Seeds sown:* Parsnip.

The vines in Poor Man's house started. Buds of trees generally swelling.

NATURAL HISTORY.—Frogs spawned. Lamperns now numerous. Bees appeared on crocus and snowdrops. Abundance of gnats. 4,000 ova of trout placed in breeding boxes. Thrushes, blackbirds, robins, chaffinches, skylarks, in full song.

FEBRUARY 19—25.—EIGHTH WEEK.

Mean temperature at Greenwich, 43°.8, being 4°.8 above the average: highest in shade, 54°.8; lowest in shade, 31°.9.—My Garden: highest in shade, 55°; lowest in shade, 30°. Black bulb: highest in sunshine, 106°; lowest on grass, 29°. Weather, fine and mild.

FLOWERS: *Glass.*—Thunbergia laurifolia. Thunbergia fragrans. Linum flavum. Cineraria.

Out of doors.—Saxifraga oppositifolia. Leucojum vernum. Russian violets in extraordinary abundance. Primroses in full flower.

FRUIT: *Glass.*—Grapes: Lady Downe's.

Out of doors.—Apples: Old Nonpareil; Braddick's Nonpareil; Ribston Pippin; Golden Drop; Calville Blanche.

VEGETALS: *Glass.*—Sea-kale. Rhubarb. Mustard. Endive.

Out of doors.—Carrots. Parsnips. Beet. Jerusalem artichokes. Onions. Collards. Savoys. Brussels sprouts. Curled kale. Celery. Celeraic. Watercress.

GARDEN OPERATIONS: *Glass.*—Protection to roots of pot trees removed.

Out of doors.—Old fronds removed from ferns in hardy ferneries. Young cauliflower plants were planted out of doors. A bed of old onions planted for early use. Beans and peas sown December 17 showed themselves above ground.

NATURAL HISTORY.—Many gnats on the wing. Kingfishers chased each other during the whole week.

" First sturdy March, with brows full sternly bent,
And in a bag all sorts of seeds ysame,
Which on the earth he strowed as he went,
And filled her womb with fruitful hope of nourishment."—SPENSER.

FEBRUARY 26.—MARCH 4.—NINTH WEEK.

Mean temperature at Greenwich, 45°.7, being 5°.6 above the average : highest in shade, 64°.8 ; lowest in shade, 30.°1.—My Garden : highest in shade, 64° ; lowest in shade, 29°. Black bulb : highest in sunshine, 115° ; lowest on grass, 24°. Weather, fine. Rainfall at my garden, 0 inch ; at Greenwich, 0.11 inch.

FLOWERS : *Glass.*—Hyacinth. Passiflora cœlestina.

Out of doors.—Periwinkle. Hyacinths. Violets : Czar ; Russian, in great perfection. Omphalodes verna. Scilla bifolia. Anemone apennina.

FRUIT : *Glass.*—Grapes : Lady Downe's.

Out of doors.—Apples : Ribston Pippin ; Braddick's Nonpareil ; Old Nonpareil ; Golden Drop ; Wellington.

VEGETALS : *Glass.*—Sea-kale. Rhubarb. Mustard. Endive.

Out of doors.—Jerusalem artichokes. Carrots. Parsnips. Savoys. Collards. Kale. Brussels sprouts. Leeks. Celery. Celeraic. Watercress. Horse-radish.

GARDEN OPERATIONS : *Glass.*—Second crop of frame potatoes planted. *Seeds sown :* Kidney beans. Asters.

Out of doors.—Seeds sown : Peas : Champion of England, Laxton's Prolific, Leviathan ; green Windsor beans ; olive-shaped radish ; round spinach. Asparagus bed forked down.

NATURAL HISTORY.—Yellow butterfly appeared. Male swan took to nest. Wireworms destructive to lettuces in frame. Trout finished spawning. Ova in breeding-boxes showed eyes.

MARCH 5—11.—TENTH WEEK.

Mean temperature at Greenwich, 46°.3, being 6° above the average : highest in the shade, 57°.2 ; lowest in shade, 33°.7.—My Garden : highest in shade, 59° : lowest in shade, 31°. Black bulb : highest in sunshine, 110° ; lowest on grass, 24°. Weather, showery. Rainfall at my garden, 0.36 inch ; at Greenwich, 0.47 inch.

FLOWERS : *Glass.*—Oncidium luridum. Calceolarias. Apricot trees.

Out of doors.—Adonis vernalis. Arabis grandiflora. Aubrietia deltoides. Draba azoides. Double primrose. Daffodil. Wood anemone. Primula minima. Dog's-tooth violet. Small vinca. Petasites. Frond of Cystopteris fragilis appeared.

FRUIT : *Glass.*—Grapes : Lady Downe's Seedling.

Out of doors.—Apples : Braddick's Nonpareil ; Golden Drop ; Old Nonpareil ; Webb's Russet ; Fearn's Pippin ; Alfriston.

VEGETALS : *Glass.*—Sea-kale. Rhubarb. Mushrooms. Mustard. Cucumber.

Out of doors.—Jerusalem artichokes. Parsnips. Carrots. Onions. Beet. Collards. Savoys. Brussels sprouts. Cottagers' kale. Endive. Mustard. Cress. Watercress. Celery. Celeraic.

GARDEN OPERATIONS: *Glass.*—Seedling ferns potted and new cranberry bed made. *Out of doors.*—Grass mown for the first time. First crop of peas staked. Roses pruned. Box edging replanted. Mossery planted. *Seed sown:* Radish.
NATURAL HISTORY.—Peacock butterfly appeared. Ova of Siredon pisciformis hatched out.

MARCH 12—18.—ELEVENTH WEEK.

Mean temperature at Greenwich, 41°.7, being the average: highest in shade, 59°.4; lowest in shade, 28°.9.—My Garden: highest in shade, 56°; lowest in shade, 28°. Black bulb: highest in sunshine, 101°; lowest on grass, 21°. Rainfall at my garden, 0.73 inch; at Greenwich, 0.58 inch.

During the week a considerable change occurred in the aspect of the garden. The snowdrops and crocuses had finished their blossom, and were replaced by hyacinths and daffodils, and fruit-trees commenced to flower.

FLOWERS: *Glass.*—Roses. The orchid-house was in its prime. The apricots, peaches, and nectarines were in full bloom, and beneath their branches hyacinths displayed their blossom.
Out of doors.—Almond-trees. Gooseberry bushes in leaf and commencing to blossom. Marsh marigold. Narcissus polyanthus. Chamæbuxus. Aubrietia græca.
FRUIT: *Glass.*—Grapes: Lady Downe's finished.
Out of doors.—Apples: Lemon Pippin; Golden Pippin; Boston Russet; Old Nonpareil; Alfriston.
VEGETALS: *Glass.*—Sea-kale. Mushrooms. French beans. Mustard. Radishes. Cucumbers.
Out of doors.—Jerusalem artichokes. Parsnips. Onions. Carrots. Beet. Leek. Brussels sprouts. Collards. Savoys. Kale. Celery. Celeraic. Watercress.
GARDEN OPERATIONS: *Glass.*—Orchids cleaned and potted. Shoots of growing vines tied. First crop of melons planted.
Out of doors.—Seeds sown: Onions; leeks; six-week turnips. Rose-trees, pruning finished. Tea-roses planted. Clematis planted. Box-edging planted. Second crop of peas earthed. Strawberry plants placed in heat.
NATURAL HISTORY.—Rooks busy with their nests. Male swan on nest. Cucumber plants attacked by aphides. Red spider and mealy bug appeared in fernery. Orchard-house full of bees. Many small flies.

MARCH 19—25.—TWELFTH WEEK.

Mean temperature at Greenwich, 47°.1, being 4°.9 above the average: highest in shade, 70°.9; lowest in shade, 30°.2.—My Garden: highest in shade, 71°; lowest in shade, 32°. Black bulb: highest in sunshine, 131°.5; lowest on grass, 27°. Weather, fine. Rainfall at my garden, 0.02 inch; at Greenwich, 0.02 inch.

FLOWERS: *Glass.*—Dendrobium aggregatum. Maxillaria Harrisonii. Franciscea latifolia. Orange trees. Deutzia gracilis. *In Orchard-house.*—Plum and apricot flowers off, fruit set.

Out of doors.—Cherry. Peach. Nectarine and currant bushes. Oxalis acetosella. Wild tulip of Italy. Wild anemone of Rome. Doronicum caucasicum. Orobus vernus. Triteleia uniflora. Schivereckia podolica. Muscari.

FRUIT: *Out of doors.*—Apples: Ribston Pippin; Pearson's Plate; Boston Russet; Winter Pearmain; Golden Drop; Alfriston; Kentish Fillbasket.

VEGETALS: *Glass.*—French beans. Mushrooms. Cucumbers. Radishes. Mustard. Curled Australian cress. Sea-kale.

Out of doors.—Jerusalem artichokes. Parsnips. Carrots. Onions. Beet. Brussels sprouts. Collards. Kale. Watercress. Celery.

GARDEN OPERATIONS: *Glass.*—Fuchsia and rooted cuttings of roses potted. *Seeds sown:* Melon and cucumber.

Out of doors.—Seeds sown: Carrots; Brussels sprouts; broccoli; savoy; winter savory; sage and marjoram; thyme; parsley. Second crop of celery. Chicory. Mushroom bed made.

NATURAL HISTORY.—Water tortoise appeared for the first time. Many bees in orchard-house. Brimstone and tortoiseshell butterflies were seen during the whole week.

"Next came fresh April, full of lustyhead,
And wanton as a kid whose horn new buds."—SPENSER.

MARCH 26—APRIL 1.—THIRTEENTH WEEK.

Mean temperature at Greenwich, 43°.8, being 0°.2 above the average: highest in shade, 67°.4; lowest in shade, 31°.2.—My Garden: highest in shade, 67°; lowest in shade, 30°. Black bulb: highest in sunshine, 132°; lowest on grass, 24°. Weather, dry and cold. Rainfall at my garden, 0.03 inch; at Greenwich, 0.36 inch.

FLOWERS: *Glass.*—Dendrobium Pierardii. Lapageria rosea. Prunus triloba. Mentissia saltatoria.

Out of doors.—Pear-trees: St. Germain and Doyenné d'Eté. Plum-trees, currant and gooseberry bushes in full flower. Epimedium alpinum. Myosotis dissitiflora. Fritillaria meleagris. Orobus vernus. Narcissus. Saxifraga palmata. Tulips. The fronds of Cystopteris montana started, also those of Struthiopteris germanica. Adiantum pedatum. Varieties of lady-ferns. Scolopendrium.

FRUIT: *Out of doors.*—Apples: Boston Russet; Golden Drop: Sturmer Pippin; Winter Pearmain; Wellington; Gloria Mundi.

VEGETALS: *Glass.*—Mushrooms. French beans. Cucumbers. Radishes.

Out of doors.—Jerusalem artichokes. Parsnips. Carrots. Onions. Beet. Brussels sprouts. Kale. Collards. Mustard. Curled, Australian, and Water cress.

GARDEN OPERATIONS.—Rose cuttings placed in cutting-house from forced trees. Second crop of cauliflower and cabbage planted. Sticks placed to second crop of peas. Apple and pear trees grafted. Wild orchids planted. *Seeds sown:* French Horn carrot; Long-pod bean.

NATURAL HISTORY.—Blackcap appeared March 30. Woodlarks noticed. Lamperns still numerous and busy in Backwater.

APRIL 2—8.—FOURTEENTH WEEK.

Mean temperature at Greenwich, 43°.1, being 2°.1 below the average: highest in shade, 56°.7; lowest in shade, 29°.1.—My Garden: highest in shade, 58°; lowest in shade, 25°. Black bulb: highest in sunshine, 133°.5; lowest on grass, 19°. Weather, dry and cold. Rainfall at my garden, 0.03 inch; at Greenwich, 0.01 inch.

A severe frost occurred on the night of Thursday, April 7, and Friday, April 8. Many fronds of ferns were frozen: those of lady-ferns were completely destroyed; and those of the royal fern were cut down. Many of the ostrich fern (*Struthiopteris*) were killed, as well as many of the Cystopteris montana and the bracken. Asparagus shoots fit for the first cutting were frosted. Cherry blossoms were frozen, and the little apricots in the orchard-house were killed. All the alpine plants in flower were injured: especially, the Epimediums, which were fine on Thursday, were killed by Saturday. Whole sheets of flower of the beautiful Oxalis acetosella were frosted, and the plants of Myosotis dissitiflora much damaged.

FLOWERS: *Glass.*—Grapes in Poor Man's house. Rhynchospermum jasminioides. Male blossoms of melons.

Out of doors.—Epimedium grandiflorum. E. rubrum.

FRUIT: *Out of doors.*—Apples: Old Nonparcil; Boston Russet; Sturmer Pippin; Wellington.

VEGETALS: *Glass.*—French beans. Mushrooms. Mustard and cress. Cucumbers. *Out of doors.*—Jerusalem artichokes. Sea-kale. Brussels sprouts. Kale. Carrots. Parsnips. Beet. Onions. Leeks. Rhubarb. Radishes. Watercress.

GARDEN OPERATIONS.—*Seeds sown:* Peas: Champion of England, in succession. Lettuces planted.

NATURAL HISTORY.—Trout ova in the breeding-boxes hatched April 5. A wild grey goose visited the lake. House-martins noticed.

APRIL 9—15.—FIFTEENTH WEEK.

Mean temperature at Greenwich, 48°.3, being 3°.2 above the average: highest in shade, 66°.5; lowest in shade, 30°.—My Garden, highest in shade, 68°; lowest in shade, 26°. Black bulb: highest in sunshine, 136°.5; lowest on grass, 20°. Weather, on the 15th half a gale. Rainfall at my garden, 0.26 inch; at Greenwich, 0.36 inch.

The effects of the frosts of the preceding week were now apparent, and three-quarters of the crop of gooseberries were found to have been frozen. The expanded flowers of the fruit-trees were frozen, but those still in bud were not injured. Young seedling plants of the cabbage tribe were killed. The flower buds of the laburnum were much damaged.

FLOWERS: *Glass.*—Chlorodendron Thomsoni. C. Balfouri. C. splendens. Passiflora floribunda. Combretum purpureum.

Out of doors.—Apples: Siberian Crab; Irish Peach; Nonsuch. Cherries, Plums, and Pears in full blossom. Anemone Pulsatilla. A. hortensis. Alyssum saxatile. Aubrietia purpurea. A. Campbelli. Ranunculus amplexicaulis. Saxifraga. Gentiana acaulis. Cuckoo-flower. Ground ivy.

FRUIT.—Apples: Golden Drop; Sturmer Pippin; Winter Pearmain; Boston Russet; Old Nonpareil.

VEGETALS: *Glass.*—Cucumbers. Mustard. Curled cress. Sea-kale.

Out of doors.—Parsnips. Carrots. Onions. Beet. Leeks. Brussels sprouts. Kale. Rhubarb. Asparagus. Watercress. Radishes. Lettuce.

Every part of the river and brooks exposed to the rays of the sun was covered with confervæ and diatomes, and scum rose to the top of the water.

NATURAL HISTORY.—The nightingale appeared on the 12th, but immediately disappeared. Young thrushes and young robins were noticed.

APRIL 16—22.—SIXTEENTH WEEK.

Mean temperature at Greenwich, 50°, being 3°.6 above the average: highest in shade, 62°.8; lowest in shade, 41°.3.—My Garden, highest in shade, 63°; lowest in shade, 41°. Black bulb: highest in sunshine, 122°.5; lowest on grass, 37°. Weather, wet. Rainfall at my garden, 2.27 inches; at Greenwich, 1.75 inches.

FLOWERS: *Glass.*—Cattleya Skinneri. Dendrobium aduncum. Philadelphus mexicanus. P. speciosus.

Out of doors.—Phlox setacia. P. verna. P. divaricata. P. Nelsoni. P. subulata. Gentiana verna. Common and alpine wallflower. Trillium grandiflorum. Silene acaulis. Iris pumila. Veronica saxatilis. Viola lutea major. Vinca minor, double red variety. Aster corymbosus. Bluebells. Buttercups. Daisies.

FRUIT: *Glass.*—None.

Out of doors.—Apples: Sturmer Pippin; Old Nonpareil; Wellington.

VEGETALS: *Glass.*—Cucumbers. Sea-kale. Australian and Curled cress.

Out of doors:—Asparagus. Parsnips. Carrots. Beet. Onions Rhubarb. Brussels sprouts. Collard. Kale. Radishes. Lettuce. Sorrel. Chervil. Watercress.

GARDEN OPERATIONS: *Glass.*—Potting and cleaning orchids and ferns.

Out of doors.—*Seeds sown:* Radish; lettuce; savoys. Water-weed cut first time on mill-head.

The verdure was now in great beauty. Most trees, except the oak, ash, walnut, black poplar, and the mulberry, had their leaves about three-quarters expanded.

NATURAL HISTORY.—House-martin appeared on April 16; cuckoo, April 18; summer snipe on 22nd. The nightingale was heard in the district, but not in my garden.

APRIL 23—29.—SEVENTEENTH WEEK.

Mean temperature at Greenwich, 50°.7, being 2°.7 above the average: highest in shade, 64°.9; lowest in shade, 42°.7.—My Garden: highest in shade, 65°; lowest in shade, 37°. Black bulb: highest in sunshine, 140°; lowest on grass, 32°. Weather, thunderstorm on the 27th. Rainfall at my garden, 0.58 inch; at Greenwich, 0.80 inch.

FLOWERS: *Glass.*—Maxillaria fimbriata. Fuchsia.

Out of doors.—Trillium grandiflorum Anemone pratensis. Geum montanum. Iris nudicaulis. Saxifraga granulata. Lithospermum prostratum. Strawberries: Black Prince. Quince. Peas. Daphne Mezerium. Lilacs. Rhododendron. Azalea. Horse-chestnut.

FRUIT: *Glass.*—None.

Out of doors.—Apples: Sturmer Pippin; Wellington.

VEGETALS: *Glass.*—Cucumber. Curled and Australian cress. Mushrooms. Potatoes.

Out of doors.—Asparagus. Sea-kale. Parsnips. Carrots. Beet. Onions. Collard. Kale. Brussels sprouts. Spinach. Radishes. Lettuce. Watercress. Chervil.

GARDEN OPERATIONS: *Glass.*—Second crop of melons planted. Grapes thinned in Poor Man's house.

Out of doors.—Seeds sown: Peas; broad beans in succession; French beans; radishes; lettuce. Planted cauliflowers. Some ferns were removed from the Orchard-house on the 29th to the outdoor ferneries.

The garden was in great perfection, and perhaps the most striking plants were the marsh marigold and Gentiana acaulis. The apple blossom was now in all its beauty, but the Court-pendu Plat trees were so far behind the other varieties as to appear dead by their side. Cherry, plum, and pear trees were nearly out of blossom, and had their fruit set. During the week the ferns had made great growth, and the oak-fern was dazzling from the brightness of its fronds.

NATURAL HISTORY.—The young trout had lost the umbilical vesicle, and were very active. Ducklings hatched, but the swans immediately spitefully killed them. Two nightingales visited the garden April 27, but disappeared. Stickleback ova hatched, and numerous sticklebacks' nests were observed.

"Then came fair May, the fairest maid on ground,
Decked all with dainties of her season's pride,
And throwing flow'rs out of her lap around."—SPENSER.

APRIL 30—MAY 6.—EIGHTEENTH WEEK.

Mean temperature at Greenwich, 49°.7, being 1° below the average: highest in shade, 69°.9; lowest in shade, 36°.1.—My Garden: highest in shade, 66°.5; lowest in shade, 33°. Black bulb: highest in sunshine, 146°; lowest on grass, 30°. Weather, fine. Rainfall at my garden, 0.25 inch; at Greenwich, 0.20 inch.

FLOWERS: *Glass.*—Lycaste aromatica. Oncidium altissimum.

Out of doors.—White and scarlet thorn. Lily of the valley. Veronica gentianoides. Dodecatheon integrifolium. Coronilla minima. Trollius europæus. Viola hirta. Saxifraga granulata. S. pectinata. S. pyramidalis. Linum austriacum. Silene pendula. Epimedium diphyllum. The ground was strewed with the cottony down of the flowers of the poplar.

FRUIT: *Glass.*—None.

Out of doors.—Apples: Sturmer Pippin; Boston Russet; Wellington.

VEGETALS: *Glass.*—Cucumbers. Sea-kale. Carrots. Potatoes (well ripened) Australian cress.

Out of doors.—Asparagus. Morels. Parsnips. Onions. Beet. Collards. Brussels sprouts. Broccoli. Kale. Spinach. Chervil. Radish. Watercress.

GARDEN OPERATIONS: *Glass.*—First crop of melons set. *Seeds sown:* Third crop of melons.

Out of doors.—Seeds sown: Gherkins; Peas: Veitch's Perfection, Ne Plus Ultra; broad beans, long-podded beans; second crop of scarlet runners; Negro French beans; radish and lettuce in succession.

NATURAL HISTORY.—Nightingales appeared, but again disappeared. Young trout in breeding-boxes well and active. Eels observed on their upward migration on the fish-ladder.

"Come, May, with all thy flowers,
Thy sweetly-scented thorn;
Thy cooling ev'ning showers,
Thy fragrant breath at morn."
MOORE'S *Irish Melodies.*

MAY 7—13.—NINETEENTH WEEK.

Mean temperature at Greenwich, 47°.6, being 3°.8 below the average: highest in the shade, 72°.9; lowest in shade, 34°.—My Garden: highest in shade, 71°.5; lowest in shade, 32°. Black bulb: highest in sunshine, 104°; lowest on grass, 29°.5. Weather, fine. Rainfall at my garden, 0.44 inch; at Greenwich, 0.15 inch.

A thunderstorm occurred on May 9th, which formed suddenly, and was attended with a rapid diminution of temperature.

FLOWERS: *Glass.*—Passiflora edulis. Zonal pelargoniums.

Out of doors.—Lupins. Laburnum. Guelder rose. Linum flavum. Orchis morio. White butterfly orchid. Fly orchid. Erinus alpinus roseus. Erigeron speciosus. Linum austriacum. Geum concinnum. Iris caucasica. Cerastium Biebersteini. Centaurea montana. Antennaria hyperborea. Arenaria peploides. Pyrethrum. Veronica saxatilis. Primula cortusoides. P. amœna. Alpine snapdragon. Quinces. Raspberries and mulberries. Only one apple-tree remained in blossom.

VEGETALS: *Glass.*—Cucumbers. Carrots. Australian cress.

Out of doors.—Asparagus. Spinach. Brussels sprouts. Collards. Kale. Beet. Rhubarb. Onions. Lettuce. Radishes. Watercress. Chervil.

GARDEN OPERATIONS: *Glass.*—Bunches of grapes thinned out and tied. Many pot fruits removed from Orchard-house.

Out of doors.—Seeds sown: Broccoli: Snow's Winter White; Early Penzance. Walcheren cauliflower, for Michaelmas crop; radish in succession; lettuce. Planted lettuce in succession.

NATURAL HISTORY.—Swifts appeared on the 10th. Reed-warblers built in shrubs.

MAY 14—20.—TWENTIETH WEEK.

Mean temperature at Greenwich, 50°.1, being 2°.5 below the average: highest in shade, 69°.8; lowest in shade, 36°.3.—My Garden: highest in shade, 71°; lowest in shade, 31°.5. Black bulb: highest in sunshine, 155°; lowest on grass, 29°.5. Weather, fine. Rainfall at my garden, 0.3 inch; at Greenwich, 0.16 inch.

FLOWERS: *Glass.*—Dendrobium calcaratum. Stigmaphyllum ciliatum. Hoya bella. Cattleya Mossiæ. Pelargoniums. Verbenas.

Out of doors.—Myosotis rupicola. M. palustris. Muscari comosum. Dryas octopetala. Erodium. Saxifrages, various species. Lychnis viscaria. Borage. Scotch briar. Broad beans.

FRUIT : *Glass.*—Strawberries. White currants.

Out of doors.—Apples : Sturmer Pippin ; Alfriston.

VEGETALS : *Glass.*—Cucumbers. Mushrooms. Potatoes. Carrots.

Out of doors.—Cabbages. Collards. Kale. Asparagus. Beet. Spinach. Onions. Lettuces. Radishes. Chervil. Australian, Curled, and Water cress.

GARDEN OPERATIONS: *Glass.*—Second crop of melons earthed. Rose cuttings put in.

Out of doors.—Planted Brussels sprouts. *Seeds sown:* Turnips, lettuce, radish, for succession.

Grapes in Poor Man's house stoning. Young nuts appeared.

NATURAL HISTORY.—Fly-catchers first seen. Cockchafers seen. Warblers had nests. Bees swarmed.

MAY 21—27.—TWENTY-FIRST WEEK.

Mean temperature at Greenwich, 56°.7, being 2°.1 above the average : highest in shade, 79°.5 ; lowest in shade, 38°.8.—My Garden : highest in shade, 80°.5 : lowest in shade, 36°.5. Black bulb : highest in sunshine, 143° ; lowest on grass, 33°. Weather, fine. Rainfall at my garden, 0.32 inch ; at Greenwich, 0.22 inch.

FLOWERS : *Glass.*—Brassia verrucosa. Hoya carnosa.

Out of doors.—Weigelia rosea. Red horse-chestnut. Honeysuckle. Clematis. Azurea grandiflora. Muscari comosum. Dianthus plumarius. Polygonum, sp. Lychnis dioica rubra. Arum crinitum. Helianthemums. Erodium macradenium. Allium nutans. Thalictrum aquilegifolium. Pentstemon ovatum. Astragalus canadensis. Aquilegia vulgaris. Ajuga alpina. Gnaphalium arenarium. Saxifraga aizoon. S. pennsylvanica. S. rosularis. S. geranioides. S. tridentia. S. serratifolia major. Dianthus cæsius. Sweet-williams. Delphinium grandiflorum. D. formosum. Scotch rose. Monthly rose. Rock rose. Guelder rose. Raspberry. Mulberry. Elder flower.

FRUIT : *Glass.*—Strawberry and White Currants.

Out of doors.—Apples : Sturmer Pippin ; Wellington.

VEGETALS : *Glass.*—Cucumbers. Potatoes. Carrots.

Out of doors.—Asparagus. Cabbage. Collard. Rhubarb. Beet. Spinach. Onions. Radishes. Lettuce. Curled, Australian, and Water cress. Chervil.

GARDEN OPERATIONS : *Glass.*—Thinning peaches, nectarines, and plums, in Orchard-house.

Out of doors.—Geraniums bedded out. 250 exotic ferns bedded out. Pot hybrid roses planted to fill up gaps. Echeverias and sempervivums planted. *Seeds sown:* Lettuce ; radishes ; and Ne Plus Ultra peas.

NATURAL HISTORY.—Aphides plentiful on currants, plums, melons, cucumbers, nut bush leaves, also a few on roses. The young trout began to die in confinement, but those turned into the rivulets were very active. Landrails seen on the 25th. Jackdaws attacked the thrushes' nests. Fungus appeared on the rose. Fungus seen on under side of quince leaves, and on some pears. A great crop of nuts now visible.

"And after her came jolly June, arrayed
All in green leaves, as he a player were."—SPENSER.

MAY 28—JUNE 3.—TWENTY-SECOND WEEK.

Mean temperature at Greenwich, 53°.9, being 2°.7 below the average: highest in shade, 74°.6; lowest in shade, 40°.3.—My Garden: highest in shade, 72°; lowest in shade, 34°.5. Black bulb: highest in sunshine, 144°; lowest on grass, 30°. Weather, dry and cold. Rainfall at my garden, 0.1 inch; at Greenwich, 0.1 inch.

FLOWERS: *Glass.*—Lycaste Barringtoni. Erianthemum aspersum.

Out of doors.—Erodium grandiflorum. Iberis carnosa. Helianthemum. Dianthus suavis. Allium luteum flavum. Chelidonium grandiflorum. Musk plant. Digitalis. Roses, yellow and hybrid perpetual. Climbing roses, various. Dog-rose. Sweet pea. Dianthus fimbriatus. Medlar. Mulberry.

FRUIT: *Glass.*—Pine-apple: Queen. Strawberries.

Out of doors.—Strawberry: Black Prince, sparingly. Apples: Sturmer Pippin.

VEGETALS: *Glass.*—Cucumbers. Potatoes. Carrots.

Out of doors.—Asparagus. Cabbage. Collards. Beet. Onions. Horse-radish. Radishes. Lettuce. Chervil. Australian, Curled, and Water cress.

GARDEN OPERATIONS: *Out of doors.*—Planted cacti and mesembryanthemums. *Seeds sown:* Radish; lettuce. Hedges clipped. Pear and plum trees stopped.

NATURAL HISTORY.—Artificially hatched trout very active in small streams. During the past week the effects of the Siberian crab fungus apparent, and the leaves looked as though blasted by fire. Fungus also appeared on pear-trees, especially on the Ne Plus Meuris.

JUNE 4—10.—TWENTY-THIRD WEEK.

Mean temperature at Greenwich, 49°.9, being 7°.5 below the average: highest in shade, 66°.8; lowest in shade, 38°.7.—My Garden: highest in shade, 63°; lowest in shade, 34°. Black bulb: highest in sunshine, 141°; lowest on grass, 28°.5. Weather, fine and dry. Rainfall at Greenwich, 0.31 inch. Fires required in sitting-rooms every day during the week, being the only time within my memory.

FLOWERS: *Glass.*—Mandevilla suaveolens.

Out of doors.—Iris amœna. Iberis Tenoreana. Anthericum Liliago. Anthyllis vulneraria. Allium ciliatum. Astragalus hypoglottis. Genista saxatilis. Gypsophila dubia. Linum narbonense. Helianthemum album. Yellow Poppy. Walnut. Elder in full flower. Medlar and Mulberry still in flower.

FRUIT: *Glass.*—Pine-apple: Queen's. Strawberries: Keen's Seedling.

Out of doors.—Strawberries: Black Prince. Apples: Sturmer Pippin.

VEGETALS: *Glass.*—Cucumbers. Carrots. Potatoes.

Out of doors.—First dish of peas, those sown in December and January coming in together. Asparagus. Cabbage. Spinach. Beet. Radishes. Chervil. Australian, Curled, and Water cress.

GARDEN OPERATIONS: *Glass.*—Grapes thinned in Vinery, and heat maintained night and day. Fruit-trees in Orchard-house tied and stopped. Bed prepared for late

melons. *Planted:* Gherkins; main crop of Brussels sprouts; cauliflowers for autumn use, and cabbages. *Seeds sown:* Ne Plus Ultra peas; radishes; lettuce; scarlet runners.

Out of doors.—Shoots of pear-trees stopped.

NATURAL HISTORY.—Bees swarmed. They formed two divisions, but ultimately united and settled. Under side of plum leaves covered with green aphides.

A collection of twelve hardy ferns and a collection of six hardy ferns received first prizes, at Horticultural Society.

JUNE 11—17.—TWENTY-FOURTH WEEK.

Mean temperature at Greenwich, 59°.5, being 0°.7 above the average: highest in shade, 77°.2; lowest in shade, 47°.—My Garden: highest in shade, 78°; lowest in shade, 46°. Black bulb: highest in sunshine, 154°; lowest on grass, 40°. Weather, showery. Rainfall at my garden, 0.81 inch; at Greenwich, 1.05 inches.

FLOWERS: *Glass.*—Cymbidium aloifolium.

Out of doors.—Erigeron Villarsii. Helianthemum vulgare. Cynoglossum apenninum. Dianthus neglectus. Silene alpestris. Allium glomeratum. Anthericum Liliago. Aquilegia viscosa. Veronica aphylla. Helianthemum, double white. Campanula mollis. Arenaria balearica. Lilium umbellatum. Achillea Clavennæ. Menziesia polifolia. Garden pinks in many varieties. Pyrethrums. Mignonette. Late Dutch Honeysuckle in glorious perfection.

FRUIT: *Glass.*—Citron des Carmes.

Out of doors.—Strawberries: Black Prince in abundance; Alpine; Keen's Seedlings, a few.

VEGETALS: *Glass.*—Frame Potatoes. Cucumbers. Carrots.

Out of doors.—Peas: Daniel O'Rourke; Carter's first; Dixon's earliest. Asparagus. Cauliflower. Cabbage. Carrots. Onions. Spinach. Rhubarb. Radishes. Lettuce. Chervil. Australian, Curled, and Water cress.

GARDEN OPERATIONS: *Seeds sown.*—Radish and lettuce in succession; French beans, scarlet runners in succession.

NATURAL HISTORY.—Swallows hatched in summer-house.

First prize received for twelve English ferns at Botanic Gardens, Regent's Park.

JUNE 18—24.—TWENTY-FIFTH WEEK.

Mean temperature at Greenwich, 56°.2, being 3°.8 below the average: highest in shade, 72°.9; lowest in shade, 47°.5.—My Garden: highest in shade, 72°; lowest in shade, 40°. Black bulb: highest in sunshine, 150°.5; lowest on grass, 35°. Weather, severe, stormy during the week, with hailstones, doing considerable damage to the roses and other flowers. Rainfall at Greenwich, 1.50 inches.

FLOWERS: *Glass.*—Trichopilia tortilis.

Out of doors.—Echeveria secunda. Campanula pulla. C. persicifolia. C. linifolia. C. rupestris. Primula cortusoides. Aquilegia vulgaris. Dianthus alpinus. Oxalis floribunda. Sempervivum calcareum.

FRUIT: *Glass.*—Pine-apples: Queen. Melons. Grapes: Sweetwater. Pears from pots: Citron des Carmes (excellent): Doyenné d'Été (small).

Out of doors.—Strawberries, chiefly Black Prince; Alpine. Currants, white and red. Gooseberries. Cherries.

VEGETALS: *Glass.*—Cucumbers. Potatoes. Carrots.

Out of doors.—Peas. Asparagus. Potatoes. Cauliflowers. Cabbage. Spinach. Rhubarb. Chervil. Radishes. Lettuce. Australian, Curled, and Water cress.

GARDEN OPERATIONS: *Glass.*—Several pot peach-trees removed from Orchard-house to ripen their fruit outside, and to afford more air to those remaining inside.

Seeds sown: Radishes; lettuces; endive (first crop). Celery planted in trenches.

NATURAL HISTORY.—Young wryneck captured. Eels caught in trap.

"Then came hot July, boiling like to fire,
That all his garments he had cast away."—SPENSER.

JUNE 25—JULY 1.—TWENTY-SIXTH WEEK.

Mean temperature at Greenwich, 56°.6, being 4°.8 below the average; highest in shade, 72°.2; lowest in shade, 40°.—My Garden: highest in shade, 73°; lowest in shade, 34°. Black bulb: highest in sunshine, 147°; lowest on grass, 32°. Rainfall at Greenwich, 0.05 inch.

FLOWERS: *Glass.*—Torenia asiatica.

Out of doors.—Potentilla alchemilloides. Campanula mollis. Spanish Iris. Sedum Fosterianum. S. Pallas. S. Andersoni. S. anglicum. Sempervivum calcaratum. Spanish Broom.

FRUIT: *Glass.*—Grapes: Sweetwater. Melons. Pears: Doyenné d'Été.

Out of doors.—Strawberries: several kinds. Raspberries. Currants, red and white. Gooseberries. Cherries.

VEGETALS: *Glass.*—Mushrooms. Cucumbers.

Out of doors.—Peas: Champion of England. Potatoes. Turnips. Carrots. Cauliflowers. Onions. Jerusalem artichokes. Lettuces. Radishes. Australian, Curled, and Water cress.

GARDEN OPERATIONS: *Glass.—Planted:* Melon plants for succession; celery, after first crop of peas; strawberry runners laid on pots; cauliflower plants for autumn use. *Seeds sown:* Radishes in succession; lettuce; cress.

NATURAL HISTORY.—Young wryneck caught and placed in the Poor Man's house, where it attacked an ant's nest and devoured its inmates, but after a few days died.

JULY 2—8.—TWENTY-SEVENTH WEEK.

Mean temperature at Greenwich, 60°.5, being 1°.1 below the average: highest in shade, 76°.5; lowest in shade, 48°.8.—My Garden: highest in shade, 76°; lowest in shade, 40°. Black bulb: highest in sunshine, 147°; lowest on grass, 38°. Weather, fine. Rainfall at my garden, 0.96 inch; at Greenwich, 0.87 inch.

FLOWERS: *Glass.*—Epidendrum.

Out of doors.—Carnations. Picotees. Campanula rapunculus. C. primula alba. Grass of Parnassus. Dianthus pungens. Myosotis azoricus. Epilobium. Dodonæa. Gypsophila dubia. Coreopsis tenuifolia. Spiræa palmata. S. japonica. French beans. Scarlet runners. Lime-trees.

FRUIT: *Glass.*—Grapes: Sweetwater; Black Hamburgh. Melons. Mulberries.

Out of doors.—Strawberries, various kinds. Currants, red, white, and black. Raspberries. Gooseberries, various kinds.

VEGETALS: *Glass.*—Cucumbers.

Out of doors.—Peas: Champion of England; Laxton. Broad beans. Carrots. Cauliflowers. Cabbages. Turnips. Onions. Mushrooms. Jerusalem artichokes. Radishes. Lettuce. Australian, Curled, and Water cress.

GARDEN OPERATIONS.—Cucumbers in succession. *Planted:* Broccoli; borecole; celery; and celeraic. Keen's Seedling plants potted. *Seeds sown:* French Horn carrots in succession; radish; lettuce; Australian, Curled, and Water cress.

JULY 9—15.—TWENTY-EIGHTH WEEK.

Mean temperature at Greenwich, 61°.7, being 0°.8 below the average: highest in shade, 80°.6; lowest in shade, 49°.—My Garden: highest in shade, 79°.5; lowest in shade, 46°. Black bulb: highest in sunshine, 139°; lowest on grass, 40°.5. Weather, showery. Rainfall at my garden, 1.22 inches; at Greenwich, 1.51 inches.

FLOWERS: *Out of doors.*—Clematis rubeola. Coreopsis tenuifolia. Trollius americanus. Herbaceous phlox. Pinks passing off.

FRUIT: *Glass.*—Melons. Mulberries. Grapes: Black Hamburgh. Pears: Jargonelle, from pot trees.

Out of doors.—Strawberries: British Queen. Currants: red, white, and black. Raspberries. Gooseberries, various kinds.

VEGETALS: *Glass.*—Cucumbers.

Out of doors.—Peas: Champion of England; Laxton's. Broad beans. Cauliflowers. Cabbages. Carrots. Potatoes. Onions. Turnips. Rhubarb. Radishes. Curled, Australian, and Water cress.

GARDEN OPERATIONS: *Glass.*—Potted pine-apples. *Seed sown:* French beans in empty light, to be covered with glass in October; endive; collards; cabbage; radishes and lettuce. *Planted:* Broccoli; Brussels sprouts; lettuce.

NATURAL HISTORY.—Rose saw-flies disappeared. Soft-billed birds very active in garden.

JULY 16—22.—TWENTY-NINTH WEEK.

Mean temperature at Greenwich, 65°.5, being 3°.8 above the average; highest in shade, 82°.6; lowest in shade, 54°.—My Garden: highest in shade, 83°; lowest in shade, 52°. Black bulb: highest in sunshine, 145°; lowest on grass, 50°. Rainfall at Greenwich, 0.05 inch.

FLOWERS: *Out of doors.*—Geum chilense. Asterocephalus Webbianus. Geranium pratense flore-pleno. Clematis Jackmanni.

Carnations and picotees had this week taken the place of the pinks. Roses mostly out of blossom, and the blossom of the herbaceous phlox had taken their place.

FRUIT: *Glass.*—Grapes: Black Hamburgh. Mulberries. Melons.

Out of doors.—A few strawberries, but the crop suddenly ceased. Raspberries. Currants: red, white, and black. Gooseberries: various. Apples: White and red Juneating. Pears: Doyenné d'Été.

VEGETALS: *Glass.*—Cucumbers.

Out of doors.—Peas. Potatoes. Broad beans. French beans. Scarlet runners. Cauliflowers. Cabbages. Carrots. Marrows. Turnips. Onions. Rhubarb. Lettuce. Radish. Curled, Australian, and Water cress.

Potato disease appeared on the 17th. Red fungus on rose. Great masses of Conferva spiralis covered the whole surface of the lake. Elms made a second shoot of some inches. Pear and apple trees rapidly growing.

GARDEN OPERATIONS: *Glass.*—Cucumber plants replanted in Cucumber-house.

Out of doors.—Planted: Broccoli sprouts; broccoli; savoys; collards; cabbage, and celery.

JULY 23—29.—THIRTIETH WEEK.

Mean temperature at Greenwich, 60°.4, being 1°.5 below the average: highest in shade, 76°.6; lowest in shade, 51°.9.—My Garden: highest in shade, 83°; lowest in shade, 45°. Black bulb: highest in sunshine, 154°; lowest on grass, 31°. Weather, showery. Rainfall at Greenwich, 0.66 inch.

FLOWERS: *Glass.*—Odontoglossum phalænopsis.

Out of doors.—Dahlias. Hollyhocks. Campanula carpatica alba. Silene acaulis. Scutellaria alpina. Herbaceous phloxes now in great perfection.

FRUIT: *Glass.*—Grapes: Black Hamburgh. Melons. Mulberries. Apricots. Figs: Lee's Perpetual.

Out of doors.—Strawberries. Raspberries. Currants: red, white, and black. Apples: White Juneating. Pears: Doyenné d'Été. Plums: Rivers' Prolific.

VEGETALS: *Glass.*—Cucumbers.

Out of doors.—Peas: Veitch's Perfection. Potatoes: Rivers' Ash Leaf. Broad beans. Scarlet runners. French beans. Cauliflowers. Cabbages. Carrots. Onions. Turnips. Globe artichokes. Radish. Curled, Australian, and Water cress.

GARDEN OPERATIONS: *Out of doors.—Planted:* Broccoli; savoys, and Brussels sprouts; collards; cabbages; lettuces. *Seeds sown:* Turnip; radish; lettuce. Elm-trees and pear-trees made a second growth. The shoots of many rose-trees circumvallated.

"The sixth was August, being rich array'd
In garment all of gold down to the ground."—SPENSER.

JULY 30—AUGUST 5.—THIRTY-FIRST WEEK.

Mean temperature at Greenwich, 60°.3, being 2°.1 below the average: highest in shade, 80°.5; lowest in shade, 46°.8.—My Garden: highest in shade, 84°; lowest in shade, 45°. Black bulb: highest in sunshine, 152°; lowest on grass, 39°. Weather, fine. Rainfall at Greenwich, 0.23 inch.

FLOWERS: *Out of doors.*—Geum pyrenaicum. Anemone sylvestris. Sempervivum tabulæforme. Orobus lathyroides. Veronica amœna.

FRUIT: *Glass.*—Grapes: Black Hamburgh. Melons: various. Figs: Lee's Perpetual. Apricots. Peaches. Passiflora edulis.

Out of doors.—Apples: White Juneating; Red Juneating; Kentish Codlin. Pears: Doyenné d'Été. Plums: Rivers' Favourite. Strawberries: Alpine. Gooseberries: various kinds. Currants: white, red, black. Raspberries: white and red. Filberts. Cherries: Morello.

VEGETALS: *Glass.*—Cucumbers. Capsicums.

Out of doors.—Peas: Ne Plus Ultra; Veitch's Perfection. Beans: Green Long-pod. French beans. Scarlet runners. Cauliflowers. Cabbage. Carrots. Onions. Potatoes. Globe artichokes. Vegetal marrows. Lettuces. Curled, Australian, and Water cress.

GARDEN OPERATIONS: *Out of doors.—Seed sown:* Endive and turnip. Collards planted.

NATURAL HISTORY.—A young cuckoo captured and placed in Poor Man's house, where a little sedge-warbler visited it, and fed it for some time till it escaped.

AUGUST 6—12.—THIRTY-SECOND WEEK.

Mean temperature at Greenwich, 68°.3, being 6°.2 above the average: highest in shade, 88°.2; lowest in shade, 51°.9.—My Garden, highest in shade, 95°; lowest in shade, 49°. Black bulb: highest in sunshine, 157°; lowest on grass, 44°. Weather, fine. Rainfall at Greenwich, 0.00 inch.

FLOWERS: *Glass.*—Odontoglossum Lindleyanè.

Out of doors.—Platycodon grandiflorum. Lilium tigrinum. Gladiolus.

FRUIT: *Glass.*—Grapes: Black Hamburgh. Peaches. Figs: Lee's Perpetual. Apricots: Passiflora edulis. Melons.

Out of doors.—Apples: Quarrenden; Irish Peach. Pears: Beurré Giffard and Jargonelle. Strawberries: Alpine. Currants: Red and White Dutch. Plums. Cherries: Morello.

VEGETALS: *Glass.*—Cucumbers.

Out of doors.—Peas: Ne Plus Ultra; Veitch's. Potatoes: Rivers' Ash Leaf. Broad beans. French beans. Scarlet beans. Cauliflowers. Cabbage. Carrots. Onions. Lettuce. Curled, Australian, and Water cress.

GARDEN OPERATIONS: *Out of doors.—Planted:* Savoys, collard, and endive. During the week the trees, to some extent, have lost their leaves, and assumed their autumnal tints.

AUGUST 13—19.—THIRTY-THIRD WEEK.

Mean temperature at Greenwich, 67°.1, being 5°.8 above the average: highest in shade, 89°.2; lowest in shade, 54°.—My Garden: highest in shade, 91°: lowest in shade, 48°. Black bulb: highest in sunshine, 151°; lowest on grass, 45°. Weather, fine till end of the week. Rainfall at my garden, 0.16 inch; at Greenwich, 0.69 inch.

FLOWERS: *Glass.*—Lassandria macrantha.

Out of doors—Lilium tigrinum. Platycodon chinensis. Tritonia aurea.

FRUIT: *Glass.*—Grapes. Pine-apple. Peaches. Nectarines. Figs. Passiflora edulis.

Out of doors.—Apples: Irish Peach; Early Strawberry. Pears: Beurré Giffard; Jargonelle. Plums. Alpine Strawberries. Raspberries. Gooseberries. Currants: red and white.

VEGETALS: *Glass.*—Tomatoes. Cucumbers. Chilis. Capsicums.

Out of doors.—Peas: Ne Plus Ultra. Broad beans. French beans and Scarlet runners. Cabbage. Cauliflowers. Carrots. Turnips. Onions. Lettuces. Curled, Australian, and Water cress.

GARDEN OPERATIONS.—*Seeds sown:* Spinach; lettuce; onions—Flat Tripoli, Giant Rocca, Globe, Tripoli, Spanish, Blood-red; Curled and Australian cress. Endive planted out. Celery earthed.

AUGUST 20—26.—THIRTY-FOURTH WEEK.

Mean temperature at Greenwich, 63°, being 2°.4 above the average: highest in shade, 78°.7; lowest in shade, 50°.6.—My Garden: highest in shade, 81°; lowest in shade, 43°. Black bulb: highest in sunshine, 143°; lowest on grass, 45°. Weather, fine. Rainfall at Greenwich, 0.09 inch.

FLOWERS: *Glass.*—Oncidium Harrisonianum. Stanhopea, sp.

Out of doors.—Sedum Fabaria. Echeveria metallica. Helenium Hooperii. Lobelia. Lilium auratum.

FRUIT: *Glass.*—Grapes: Black Hamburgh; Sweetwater. Peaches: Royal George; Noblesse; Early Grosse Mignon. Nectarines: Rivers' Orange; White Roman; Magdalen. Figs: Lee's Perpetual. Melons: Green flesh.

Out of doors.—Apples: Quarrenden; Kerry Pippin; Duchess of Oldenburgh. Pears: Beurré Giffard; Jargonelle. Plums: Orleans; Denniston; Victoria. Gooseberries: Warrington. Currants: red. Strawberries: Alpine. Nuts: Red Filberts. Raspberry: October red.

VEGETALS: *Glass.*—Cucumbers. Tomatoes.

Out of doors.—Peas: Ne Plus Ultra. Kidney beans; Negro; Broad beans; Green Windsor; Scarlet runners. Cabbage: Nonpareil. Cauliflower. Carrots: French Horn. Onions: Globe; Tripoli. Turnips: Early Six Weeks. Vegetal marrows. Lettuces. Curled, Australian, and Water cress.

GARDEN OPERATIONS: *Out of doors.—Seeds sown:* Cauliflowers: Early London.

"Next him September marched, eke on foot;
Yet was he heavy laden with the spoil
Of harvest's riches, which he made his boot."—SPENSER.

AUGUST 27—SEPTEMBER 2.—THIRTY-FIFTH WEEK.

Mean temperature at Greenwich, 64°, being 4°.6 above the average: highest in shade, 82°; lowest in shade, 46°.1.—My Garden: highest in shade, 81°; lowest in shade, 43°. Black bulb: highest in sunshine, 145°; lowest on grass, 41°. Rainfall at Greenwich, 0.02 inch.

FLOWERS: *Glass.*—Oncidium Harrisonianum.

Out of doors:—Portulacas. Cactus. Nightshade. Lilium lancifolium rubrum. Margyricarpus setosus. Helianthus decapetalus.

FRUIT: *Glass.*—Grapes: Black Hamburgh; Sweetwater. Peaches: Royal George; Noblesse; Royal Charlotte; Barrington. Nectarines: Rivers' Orange; Magdalen. Melons: James's; Cox's Scarlet; Golden Gem; Scarlet Gem. Figs: Lee's Perpetual.

Out of doors.—Apples: Benoni; Kerry Pippin; Quarrenden; Whorle Pippin; Lord Suffield; Duchess of Oldenburgh; Kentish Codlin. Pears: Beurré Giffard; Jargonelle. Plums: Green Gage; Orleans; Goliath; Coe's Golden Drop; Jefferson; Prince of Wales. Nuts: Red Filberts. Strawberries: Alpine. Currants: Red Dutch. Gooseberries: Warrington. Peaches and Nectarines, from a wall.

VEGETALS: *Glass.*—Cucumbers. Tomatoes. Capsicums.

Out of doors.—Peas: Ne Plus Ultra. Broad beans; Green Windsor; French beans; Negro; Scarlet runners. Cauliflowers. Cabbages: Nonpareil. Carrots: French Horn. Turnips: Early Six Weeks. Onions: Tripoli. Potatoes: Rivers' Royal Ash Leaf. Vegetal marrows. Globe artichokes. Lettuce. Watercress.

GARDEN OPERATIONS.—Planting geranium and verbena cuttings.

SEPTEMBER 3—9.—THIRTY-SIXTH WEEK.

Mean temperature at Greenwich, 60°.5, being 2°.6 above the average: highest in shade, 76°.3; lowest in shade, 46°.6.—My Garden: highest in shade, 81°: lowest in shade, 45°. Black bulb: highest in sunshine, 141°; lowest on grass, 40°. Weather, fine. Rainfall at my garden, 0.56 inch; at Greenwich, 0.66 inch.

FLOWERS: *Glass.*—Aristolochia gigas.

Out of doors.—Vallota purpurea. Lilium lancifolium album.

FRUIT: *Glass.*—Grapes: Black Hamburgh. Melons: Golden Perfection; Scarlet Gem. Peaches: Royal George; Noblesse. Nectarines: Rivers' Orange; Violet Hâtive.

Out of doors.—Peaches. Plums: Goliath; Prince of Wales; Green Gage; Black Diamond; Victoria. Apples: Quarrenden; Kerry Pippin; Gravenstein; Kentish Codlin; Lord Suffield; Pratt's Pudding. Pears: Jargonelle. Strawberries: Alpine. Currants: Red Dutch.

GARDEN OPERATIONS: *Out of doors.*—Cuttings of geraniums and verbenas planted. Collards planted. Onions taken up.

SEPTEMBER 10—16.—THIRTY-SEVENTH WEEK.

Mean temperature at Greenwich, 62°.6, being 5°.3 above the average: highest in shade, 78°.6; lowest in shade, 52°.5.—My Garden: highest in shade, 79°; lowest in shade, 49°. Black bulb: highest in sunshine, 140°; lowest on grass, 43°. Weather, fine. Rainfall at Greenwich, 0.00 inch.

FLOWERS: *Glass.*—Ipomœa Horsfalli.

FRUIT: *Glass.*—Grapes: Black Hamburgh; Chasselas Musqué. Pine-apple: Queen. Melons: Scarlet Gem; Golden Perfection; Peaches: Royal George; Noblesse. Nectarines: Rivers' Orange; Pitmaston; Violet Hâtive.

Out of doors.—Apples: Kerry Pippin; King of the Pippins; Ribston; Lord Suffield; Pratt's Pudding. Pears: Williams'; Beurré Goubault. Plums: Gisborne; Victoria; Green Gage. Gooseberries: Warrington. Strawberries: Alpine. Filberts.

VEGETALS: *Glass.*—Tomatoes. Cucumbers.

Out of doors.—Peas: Ne Plus Ultra. French beans; Negro; Scarlet runners. Cauliflowers. Cabbage: Early York. Turnips: Six Weeks. Carrots: French Horn. Onions: Shallots. Lettuce. Curled, Australian, and Water cress.

GARDEN OPERATIONS: *Glass.*—Pot plants cleaned ready for the glass-houses.

Out of doors.—Apples, pears, and nuts gathered.

SEPTEMBER 17—23.—THIRTY-EIGHTH WEEK.

Mean temperature at Greenwich, 53°.6, being 2°.4 below the average: highest in shade, 67°.6; lowest in shade, 39°.—My Garden: highest in shade, 80°; lowest in shade, 34°. Black bulb: highest in sunshine, 130°; lowest on grass, 30°. Weather, fine. Rainfall at Greenwich, 0.10 inch.

FLOWERS: *Glass.*—Stanhopea.

Out of doors.—Aster.

FRUIT: *Glass.*—Grapes: Black Hamburgh. Melons. Peaches: Late Admirable.

Out of doors.—Apples: Ribston Pippin; Kerry Pippin; King of the Pippins; Lord Suffield; Pratt's Pudding. Pears: Beurré Goubault; Williams'. Plums: Victoria; Yellow Magnum Bonum.

VEGETALS: *Glass.*—Tomatoes. Cucumbers.

Out of doors.—French beans; Scarlet runners. Cabbage. Cauliflowers. Carrots. Onions. Lettuce. Curled and Water cress.

GARDEN OPERATIONS.—Apples and pears gathered. Cabbages planted. Lettuce planted. Celery earthed.

SEPTEMBER 24—30.—THIRTY-NINTH WEEK.

Mean temperature at Greenwich, 50°.2, being 4°.3 below the average: highest in shade, 65°.6; lowest in shade, 41°.9.—My Garden: highest in shade, 66°; lowest in shade, 41°. Black bulb: highest in sunshine, 115°; lowest on grass, 34°. Weather, wet and stormy. Rainfall at my garden, 3.2 inches; at Greenwich, 3.34 inches.

FRUIT: *Glass.*—Grapes: Black Hamburgh; Chasselas Musqué. Peaches: Admirable. Figs: Lee's Perpetual. Melons.

Out of doors.—Apples: Ribston Pippin; Cox's Orange Pippin; Kerry Pippin; Royal Pearmain; Lord Suffield. Pears: Williams' Bon Chrétien. Plums: Golden Drop.

VEGETALS: *Glass.*—Tomatoes. Cucumbers.

Out of doors.—French beans; Scarlet runners. Cauliflowers. Cabbage. Carrots. Onions. Lettuce. Curled, Australian, and Water cress.

GARDEN OPERATIONS: Ferns and Climbers in house cleared.

Out of doors.—Onions stored. Crocus bulbs planted. Anemones planted. Apples and pears gathered.

"Then came October, full of merry glee;
For yet his noule was totty of the must
Whiche he was treading in the wine-fat's see."—SPENSER.

OCTOBER 1—7.—FORTIETH WEEK.

Mean temperature at Greenwich, 51°.9, being 1°.4 below the average: highest in shade, 64°.8; lowest in shade, 41°.5.—My Garden: highest in shade, 65°; lowest in shade, 37°. Black bulb: highest in sunshine, 130°; lowest on grass, 34°. Rainfall at Greenwich, 0.77 inch.

FRUIT: *Glass.*—Grapes: Black Hamburgh. Peach: Late Admirable. Figs: Lee's Perpetual.

Out of doors.—Apples: Ribston Pippin; King of the Pippins; Kerry Pippin; Royal Pearmain; Lord Suffield; Lord Grosvenor. Pears: Beurré Goubault; Alexandrina. Plums: Scarlet Magnum Bonum. Filberts.

VEGETALS: *Glass.*—French beans. Tomatoes. Capsicums. Cucumbers.

Out of doors.—Scarlet runners. Cabbages. Collards. Carrots. Cauliflowers. Brussels sprouts. Onions. Celery. Curled, Australian, and Water cress.

GARDEN OPERATIONS: *Glass.*—Potting and housing ferns. Top-dressing rosaries.

On October 4th a collection of apples from my garden was exhibited at the International Fruit Show at the Horticultural Society, for which an extra prize was awarded. For the best collection of dessert apples mine secured the first prize for 60 dishes of what was reported as "very fine fruit." For culinary apples, the second prize was obtained for 50 dishes, which were reported "not to be quite so large as we usually have them, but very good for the season." The second prize was awarded for dessert pears, the first having been obtained by MM. Baltet of Troyes. As all my fruit was of my own growth, this test of the mode of horticulture, and the character of my selections, was very satisfactory to me, competing as I did against the gardens of all other European countries, and of all the large nurserymen of England.

OCTOBER 8—14.—FORTY-FIRST WEEK.

Mean temperature at Greenwich, 45°.5, being 5°.9 below the average: highest in shade, 59°.2; lowest in shade, 31°.2.—My Garden: highest in shade, 60°; lowest in

shade, 29°. Black bulb : highest in sunshine, 130.5° ; lowest on grass, 27°. Rainfall at Greenwich, 0.00 inch.

FLOWERS : *Out of doors.*—Aster multiflorus.

FRUIT : *Glass.*—Grapes: Black Hamburgh ; Chasselas Musqué. Peaches : Admirable. Pine-apple : Queen. Figs : Lee's Perpetual.

Out of doors.—Apples : Ribston Pippins ; King of Pippins ; Court of Wick ; Golden Pippin. Pears : Louise Bonne ; Autumn Bergamot. Plums : Rochester Damson. Filberts.

VEGETALS : *Glass.*—Tomatoes. Capsicums. French beans. Cucumbers.

Out of doors.—Scarlet runners. Brussels sprouts. Collards. Cauliflowers. Cabbage. Onions. Carrots. Spinach. Celery. Curled, Australian, and Water cress.

GARDEN OPERATIONS.—Cauliflower plants placed in frames to stand the winter. Endive placed in frames for protection.

OCTOBER 15—21.—FORTY-SECOND WEEK.

Mean temperature at Greenwich, 53°.5, being 4° above the average : highest in shade, 68°.4 ; lowest in shade, 34°.5.—My garden : highest in shade, 61°.5 ; lowest in shade, 30°. Black bulb : highest in sunshine, 132° ; lowest on grass, 27°. Rainfall at my garden, not observed ; at Greenwich, 0.55 inch.

FLOWERS : *Glass.*—Echeveria metallica.

Out of doors.—Oxalis, sp. Chrysanthemums. Violets in abundance. Roses, fine specimens cut.

FRUIT : *Glass.*—Grapes : Golden Hamburgh ; Black Hamburgh ; Chasselas Musqué. Figs : Lee's Perpetual. Pine-apple : Queen.

Out of doors.—Apples : Ribston Pippin ; King of Pippins ; Golden Pippin ; Court of Wick ; Lord Suffield ; Lord Derby. Pears : Beurré Clairgeau ; Beurré Superfin ; Beurré d'Aremburg. Plums : Rochester Damson.

VEGETALS : *Glass.*—Tomatoes. Capsicums. Cucumbers. French beans.

Out of doors.—Scarlet runners. Brussels sprouts. Cabbage. Collard. Carrots. Onions. Spinach. Celery. Beet. Curled, Australian, and Water cress.

GARDEN OPERATIONS : *Glass.*—Lettuce seed sown in frame to stand the winter in frames.

Out of doors.—Late apples and pears gathered. Rose-trees mulched with stable manure. Pear-trees transplanted.

OCTOBER 22—28.—FORTY-THIRD WEEK.

Mean temperature at Greenwich, 46°.9, being 1° below the average : highest in shade, 58°.6 ; lowest in shade, 33°.—My Garden : highest in shade, 70° ; lowest in shade, 29°. Black bulb : highest in sunshine, 154° ; lowest on grass, 23°. Weather, fine. Rainfall at Greenwich, 0.01 inch.

FLOWERS : *Glass.*—Erica.

Out of doors.—Lily of the field (Amaryllis lutea).

FRUIT : *Glass.*—Grapes : Black Hamburgh ; Golden Hamburgh ; Chasselas Musqué ; White Frontignac. Pine-apple : Queen. Figs : Lee's Perpetual.

Out of doors.—Apples : Ribston Pippin ; King of Pippins ; Golden Pippin ; Court of Wick ; Lord Suffield ; New Hawthornden. Pears : Doyenné de Comice : Beurré Van Mons ; Van Mons Léon Le Clerc ; America ; Beurré Diel ; Beurré Clairgeau ; Crasanne ; Dorothée Royale nouvelle ; Nouvelle Fulvie ; Napoleon ; Duchesse d'Angoulême ; Marie Louise.

VEGETALS : *Glass.*—Tomatoes. Capsicums. Cucumbers.

Out of doors.—Brussels sprouts. Cauliflowers. Collard. Cabbage. Carrots. Onions. Spinach. Celery. Beet. Curled, Australian, and Water cress.

GARDEN OPERATIONS : *Glass.*—Potting hyacinths.

Out of doors.—Lifting and transplanting pear-trees. Repotting and top-dressing of peach, nectarine, apricot, apple, pear, plum, and mulberry trees in pots. Plum-trees lifted and roots pruned. Celery earthed.

"Next was November, he full gross and fat,
As fed with lard; * * * *
In planting eke he took no small delight."—SPENSER.

OCTOBER 29—NOVEMBER 4.—FORTY-FOURTH WEEK.

Mean temperature at Greenwich, 47°.3, being 0°.9 above the average : highest in shade, 57°.8 ; lowest in shade, 41°.8.—My Garden : highest in shade, 59° ; lowest in shade, 32°. Black bulb : highest in sunshine, 100° ; lowest on grass, 24°. Weather, fine. Rainfall at Greenwich, 0.04 inch.

FLOWERS : *Glass.*—Cypripedium insigne.

FRUIT : *Glass.*—Grapes : Black Hamburgh ; White Frontignac. Pine-apple : Queen.

Out of doors.—Apples : Ribston Pippin ; Cox's Orange Pippin ; Court of Wick ; New Hawthornden ; Lord Derby. Pears : Beurré de Lamy ; Beurré Superfin ; Beurré Diel ; Nouveau Poiteau ; Beurré Clairgeau ; Crasanne.

VEGETALS : *Glass.*—Cucumber. Capsicum.

Out of doors.—Scarlet runners. Cauliflower. Cabbage. Collards. Brussels sprouts. Carrots. Artichokes. Spinach. Onions. Celery. Beet. Endive. Curled, Australian, and Water cress.

GARDEN OPERATIONS : *Glass.*—Sea-kale placed in frames. Violets planted in frames.

Out of doors.—Pear-trees lifted. Plum-tree roots pruned.

NATURAL HISTORY.—Redwings first seen on October 31 ; fieldfares on November 2nd.

NOVEMBER 5—11.—FORTY-FIFTH WEEK.

Mean temperature at Greenwich, 39°.2, being 5°.7 below the average ; highest in shade, 50° ; lowest in shade, 26°.4.—My Garden : highest in shade, 49° ; lowest in shade, 26°. Black bulb : highest in sunshine, 111° ; lowest on grass, 20°. Weather, fine. Rainfall at Greenwich, 0.03 inch.

FLOWERS: *Glass.*—Cyclamens. Epacris.

FRUIT: *Glass.*—Grapes: Black Hamburgh; Golden Hamburgh; Chasselas Musqué.

Out of doors.—Apples: Ribston Pippin; Cox's Orange Pippin; Court of Wick; Golden Pippin; New Hawthornden; Cellini Pippin. Pears: Dr. Trousseau; Doyenné Sieulle; Van Mons Léon Le Clerc; Beurré Diel; Joséphine de Malines; Autumn Bergamot; Beurré Superfin.

VEGETALS: *Glass.*—Cucumbers.

Out of doors.—Brussels sprouts. Cabbage. Collards. Carrots. Artichokes. Spinach. Onions. Cauliflowers. Celery. Beet. Endive. Curled, Australian, and Water cress.

GARDEN OPERATIONS: *Glass.*—Rose cuttings potted. Pot roses housed.

Out of doors.—Rhubarb arranged for forcing. Pear-trees pruned. Pear-tree orchard manured and dug.

NOVEMBER 12—18.—FORTY-SIXTH WEEK.

Mean temperature at Greenwich, 35°.3, being 7°.6 below the average; highest in shade, 51°; lowest in shade, 25°.0—My Garden: highest in shade, 55°; lowest in shade, 20°. Black bulb: highest in sunshine, 91°; lowest on grass, 15°. Weather, snow-storm on 17th. Rainfall at Greenwich, 0.29 inch.

FLOWERS: *Glass.*—Epacris. Camellias.

FRUIT: *Glass.*—Grapes: Black Hamburgh; Golden Hamburgh; Chasselas Musqué; Frontignac. Pine-apple: Queen.

Out of doors.—Apples: Ribston Pippin; King of Pippins; Golden Pippin; Court of Wick; Syke House Russet; New Hawthornden. Pears: Chaumontelle; Autumn Bergamot; Joséphine de Malines; Dr. Trousseau; Gansell's late Bergamot; Huyshe's Victoria; Forelle; Swan's Egg.

VEGETALS: *Glass.*—Cucumbers.

Out of doors.—Brussels sprouts. Collards. Carrots. Jerusalem artichokes. Spinach. Turnips. Horse-radish. Onions. Celery. Beet. Endive. Curled, Australian, and Water cress.

GARDEN OPERATIONS: *Glass.*—Housing pot fruit-trees. Potting verbenas.

Out of doors.—Asparagus beds manured and covered up. Apple-trees pruned.

NOVEMBER 19—25.—FORTY-SEVENTH WEEK.

Mean temperature at Greenwich, 34°.3, being 7°.1 below the average: highest in shade, 44°.2; lowest in shade, 20°.3.—My Garden: highest in shade, 55°; lowest in shade, 17°. Black bulb: highest in sunshine, 91°; lowest on grass, 10°. Rainfall at Greenwich, 0.10 inch.

FLOWERS: *Glass.*—Primula fimbriata alba. Peristeria alata.

Out of doors.—Violets: Czar.

FRUIT: *Glass.*—Grapes: Black Hamburgh; Golden Hamburgh; Chasselas Musqué; Buckland's Sweetwater; White Frontignac.

Out of doors.—Apples: Ribston Pippin; Golden Pippin; Court of Wick; Pearson's Plate; Cornish Gilliflower; New Hawthornden. Filberts. Pears: Zéphirin Grégoire; Joséphine de Malines; Bergamotte Esperen; Chaumontelle; Forelle.

VEGETALS: *Glass.*—Cucumber.

Out of doors.—Brussels sprouts. Collards. Spinach. Leeks. Artichokes. Carrots Turnips. Onions. Red cabbage. Celery. Beet. Endive. Curled, Australian, and Water cress.

GARDEN OPERATIONS.—Plunging pot fruit-trees and covering roots with straw. Pruning apple-trees. Covering sea-kale roots. Collecting leaves. Forking flower-border. Storing parsnips.

NATURAL HISTORY.—Eight sea-gulls passed over towards the east. About thirty wild ducks passed south.

"And after him came next the chill December;
Yet he, through merry feasting which he made,
And great bonfires, did not the cold remember."—SPENSER.

NOVEMBER 26—DECEMBER 2.—FORTY-EIGHTH WEEK.

Mean temperature at Greenwich, 36°.4, being 5°.2 below the average: highest in shade, 42°.9; lowest in shade, 28°.5.—My Garden: highest in shade, 49°; lowest in shade, 24°.5. Black bulb: highest in sunshine, 70°; lowest on grass, 19°. Weather, fine.—Rainfall at Greenwich, 0.12 inch.

FLOWERS: *Glass.*—Tropæolum: Fire-ball.

FRUIT: *Glass.*—Grapes: Black Hamburgh; Muscat of Alexandria; Ingram's Muscat.

Out of doors.—Apples: Ribston Pippin; Golden Pippin; Golden Pearmain; Pearson's Plate; Court of Wick; New Hawthornden; Cellini. Filberts. Pears; Glout Morceau; Forelle.

VEGETALS: *Glass.*—Cucumber. Mustard.

Out of doors.—Brussels sprouts. Collards. Spinach. Leeks. Artichokes. Carrots Turnips. Onions, Celery. Beet. Endive. Curled, Australian, and Water cress.

All deciduous trees had lost their leaves, the elm being the last.

GARDEN OPERATIONS.—Rhubarb taken up and housed for forcing. Carrots and parsnips stored for winter.

DECEMBER 3—9.—FORTY-NINTH WEEK.

Mean temperature at Greenwich, 29°.8, being 12.1 below the average: highest in shade, 39°.7; lowest in shade, 18°.6.—My Garden: highest in shade, 42°; lowest in shade, 11°. Black bulb: highest in sunshine, 61°; lowest on grass, 9°. Weather, frost. Rainfall at Greenwich, 0.04 inch.

FLOWERS: *Glass.*—Camellia fimbriata. Primula fimbriata rubra.

FRUIT : *Glass.*—Grapes : Muscat of Alexandria ; White Tokay ; Ingram's Muscat ; Black Hamburgh (last).

Out of doors.—Ribston Pippin ; Cox's Orange Pippin ; Pearson's Plate ; Early Nonpareil ; Golden Pippin ; Cellini ; New Hawthornden. Filberts. Pears : Glout Morceau ; Beurré Sterckmans ; Forelle ; Late Gansel's Bergamot.

VEGETALS : *Glass.*—Cucumbers. Mustard. Chicory.

Out of doors—Brussels sprouts. Cabbages. Collards. Spinach. Leeks. Carrots. Onions. Turnips. Jerusalem artichokes. Parsnips. Celery. Beet. Endive. Curled, Australian, and Water cress.

GARDEN OPERATIONS : *Glass.*—Cleaning plants.

Out of doors.—Raking leaves. Wheeling manure.

DECEMBER 10—16.—FIFTIETH WEEK.

Mean temperature at Greenwich, 39°.9, being 0°.6 below the average : highest in shade, 47°.2 ; lowest in shade, 27°.2—My Garden : highest in shade, 49° ; lowest in shade, 21°. Black bulb : highest in sunshine, 85° ; lowest on grass, 18°. Weather, thaw on the 12th. Rainfall at Greenwich, 0.10 inch.

FLOWERS : *Glass.*—Epiphyllum truncatum. Epidendrum ciliare. Cypripedium barbatum. Pancratium.

FRUIT : *Glass.*—Grapes : Muscat of Alexandria ; Canon Hall Muscat ; White Tokay ; Ingram's Muscat.

Out of doors.—Apples : Ribston Pippin ; Cox's Orange Pippin ; Pearson's Plate ; Early Nonpareil ; New Hawthornden ; Cellini ; Lord Derby. Nuts. Pears : Beurré Sterckmans ; Glout Morceau.

VEGETALS : *Glass.*—Cucumbers. Mustard. Chicory.

Out of doors.—Brussels sprouts. Cabbages. Collards. Spinach. Leeks. Carrots. Turnips. Parsnips. Jerusalem artichokes. Onions. Celery. Beet. Curled, Australian, and Water cress.

GARDEN OPERATIONS : *Glass.*—Cleaning plants. Mustard-seed sown.

Out of doors.—Planting gooseberry and currant trees. Transplanting fruit-trees. Digging.

DECEMBER 17—23.—FIFTY-FIRST WEEK.

Mean temperature at Greenwich, 41°.6, being 2°.6 above the average : highest in shade, 48°.8 ; lowest in shade, 35°.3.—My Garden : highest in shade, 50°.5 ; lowest in shade, 30°. Black bulb : highest in sunshine, 70° ; lowest on grass, 24°. Weather, wet and dull. Rainfall at Greenwich, 0.51 inch.

FLOWERS : *Glass.*—Acacia vestita.

FRUIT : *Glass.*—Grapes : Muscat of Alexandria ; White Tokay ; Ingram's Muscat ; Canon Hall Muscat.

Out of doors.—Apples : Ribston Pippin ; Golden Pippin ; Cellini ; New Haw-

thornden ; Court of Wick ; Reinette Ananas ; Cornish Gilliflower. Pears : Joséphine de Malines.

VEGETALS : *Glass.*—Cucumbers. Mustard. Sea-kale. Chicory.

Out of doors.—Brussels sprouts. Cabbage. Collards. Spinach. Leeks. Artichokes. Parsnips. Carrots. Turnips. Onions. Beet. Celery. Celeraic. Endive. Curled, Australian, and Water cress.

GARDEN OPERATIONS : *Glass.*—Parsley planted under glass. Mustard-seed sown.

Out of doors.—Seeds sown : First crop of peas. Early Mazagan bean. Digging spare ground. Planting gooseberry, apple, and pear trees.

NATURAL HISTORY.—Redwings, missel thrushes, and common thrushes sang.

DECEMBER 24—30.—FIFTY-SECOND WEEK.

Mean temperature at Greenwich, 43°, being 5°.6 above the average : highest in shade, 48°.4 ; lowest in shade, 36°.—My Garden : highest in shade, 49° ; lowest in shade, 34°. Black bulb : highest in sunshine, 69° ; lowest on grass, 25°. Weather, mild and wet. Rainfall at Greenwich, 0.56 inch.

FLOWERS : *Glass.*—Dendrobium moniliforme. Azalea alba. Epacris. Cinerarias.

Out of doors.—Helleborus niger. Jasminum nudiflorum.

FRUIT : *Glass.*—Grapes : Canon Hall Muscat ; Muscat of Alexandria ; White Tokay ; West's St. Peter's ; Lady Downe's.

Out of doors.—Apples : Mannington's Pearmain ; Old Nonpareil ; Reinette Ananas ; Golden Drop ; Blenheim Orange ; Wellington ; Petworth Nonpareil ; Warner's King.

VEGETALS : *Glass.*—Forced sea-kale. Mustard. Endive.

Out of doors.—Brussels sprouts. Collards. Savoys. Carrots. Leeks. Parsnips. Turnips. Spinach. Artichokes. Onions. Beet. Celery. Celeraic. Corn salad. Curled, Australian, and Water cress.

GARDEN OPERATIONS : *Glass.*—Potting cinerarias. Sponging and cleaning plants. Laying cucumber plants.

Out of doors.—Covering sea-kale. Pruning apple-trees. Digging between fruit-trees. Digging flower-borders.

NATURAL HISTORY.—Thrush, missel thrush, and robin sang.

THE year 1871, which commenced with frost and snow, ended with rain and warmth.

In the Cucumber-house the Dove orchid was again in flower, and the cucumber was ready for use.

The Vinery again had its Muscat grapes, Lady Downe's Seedlings, and West's St. Peter's.

The Poor Man's house contributed the flowers of the azalea, of cyclamens, geraniums, camellias, and of the epacris and acacia.

The Indoor Fernery was again glorious to look upon, and was embellished by the Poinsettia, epiphyllum, passion-flower, and cypripedium.

The Fruit-room was again stored with abundance of apples.

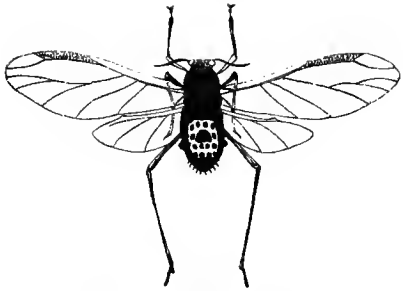
Out of doors, the Christmas rose and *Jasminum nudiflorum* gladdened our eyes with their welcome flowers.

After all the changes of the seasons of 1871 the vegetation of the garden, substantially in the same state at the end of the year as it was at the beginning, was ready to undergo another cycle of changes for the year 1872.

"Times do change and move continually,
So nothing here long standeth in one stay:
Wherefore this lower world who can deny
But to be subject still to mutability."

Vign. XXXII.—Winter View from the door of the Glass Fernery.

Plate 22.

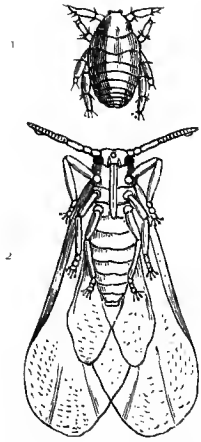


1. Lachnus Saligna
(winged insect).

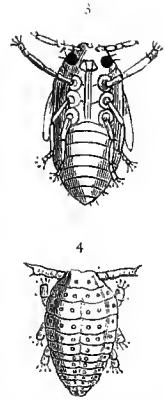
2. Lachnus Saligna
(larva).

3. Great Willow Aphis (Lachnus Saligna) on Branch.

4. Willow Trees killed by Aphis and Fungus



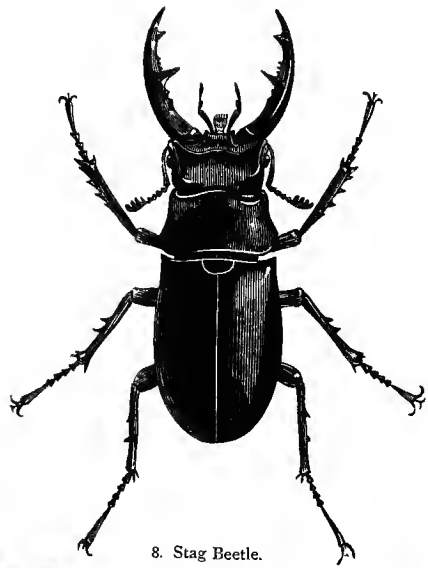
1. Phylloxera, larva (magnified).
2. ,, winged insect (do.).



3. Phylloxera, larva (magn.).
4. ,, pupa (do.)

5. Root of Vine attacked by Phylloxera.

6. Leaf of Vine, with Pouches containing the Insects.
7. Phylloxera on Leaf.



8. Stag Beetle.

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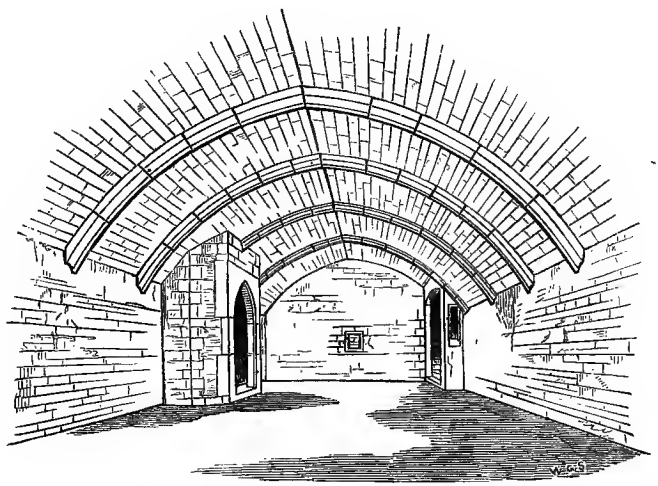

Vign. XXXIII.—Crypt beneath Wallington House.